FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

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OFFICIAL ORGAN OF THE ROYAL AERO CLUB

SIXPENCE
EVERY THURSDAY

FLIGHT
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Air Raid Precautions

BRITAIN has decided to follow the example of other nations in preparing to protect the civil population against air raids. It is a thought very humiliating to twentieth-century humanity that such steps should be necessary, but certainly it would be foolish to risk being caught unprepared. The precautions have to deal with the possibility of gas bombs as well as the ordinary high-explosive bombs, and this emphasises the degradation of humanity. The "good old days" were not always so good as fancy has painted them, but they were certainly better in this respect, that the conscience of the civilised world condemned attacks on civilians, whereas now it is felt necessary to guard against the possibility of such attacks—attacks of the most brutal and inhuman description.

Taking precautions, however, does not make it certain that the worst will necessarily happen. The Great War was ruthless enough in many ways, and the use of gas against soldiers, which was begun by Germany on April 22, 1915, was an outrage which cannot be forgiven, but at least gas bombs were not dropped on the residential quarters of cities. That such a possibility has to be contemplated twenty years later shows that Europe has been slipping along the *facilis decensus Averno*. Chemical warfare ought to be forbidden by the League of Nations with all the emphasis at its command, and if it were universally condemned, the history of war shows that there is every chance that the ban would have considerable, if not complete, effect. It might be disregarded by nations so strong and brutal that they feared no consequences, or by nations so full of despair that they had forgotten all restraint, but normally the ban would be respected by belligerents.

Those who would consider the matter, as was done by the conference recently organised at the Caxton Hall by the League of Nations Union, should not forget that there are two possible forms of air attack from which civilians may suffer. First there are attacks with high-explosive bombs on military objectives in a city, and secondly there are deliberate attacks on the civilian population in its residential areas. The latter, if made, might well be made with gas bombs. There is a great difference between these two forms of attack. The attack on military objectives, even in a populous city, can hardly be prevented by any regulation or agreement, and if such a regulation were made it would certainly be disregarded. London, for example, is full of targets which it would be perfectly legitimate for an enemy to attack with high-explosive bombs. Even the best-trained bombers will sometimes miss their target, and then the bombs are likely to kill civilians in the neighbourhood. Such casualties are deplorable, and if the enemy is really civilised (a few years ago one might have written "if he were chivalrous," but the word is now out of fashion) he will deplore the casualties which he has accidentally inflicted. He will also regret the waste of a good bomb transported many miles by a bombing crew at great risk to their lives. The Government of the bombed city will, on the other hand, in its heart of hearts rejoice that the military objective escaped: it can more easily spare a few dozen civilian lives. The main thing, however, from the civilians' point of view, is that these accidental casualties will be limited in number. A deliberate attack with gas bombs on a residential area might cause widespread slaughter on a scale with which the accidental killings could not be compared. Yet some of the spokesmen of the League of Nations Union said that they were not interested in efforts to make war "more polite."

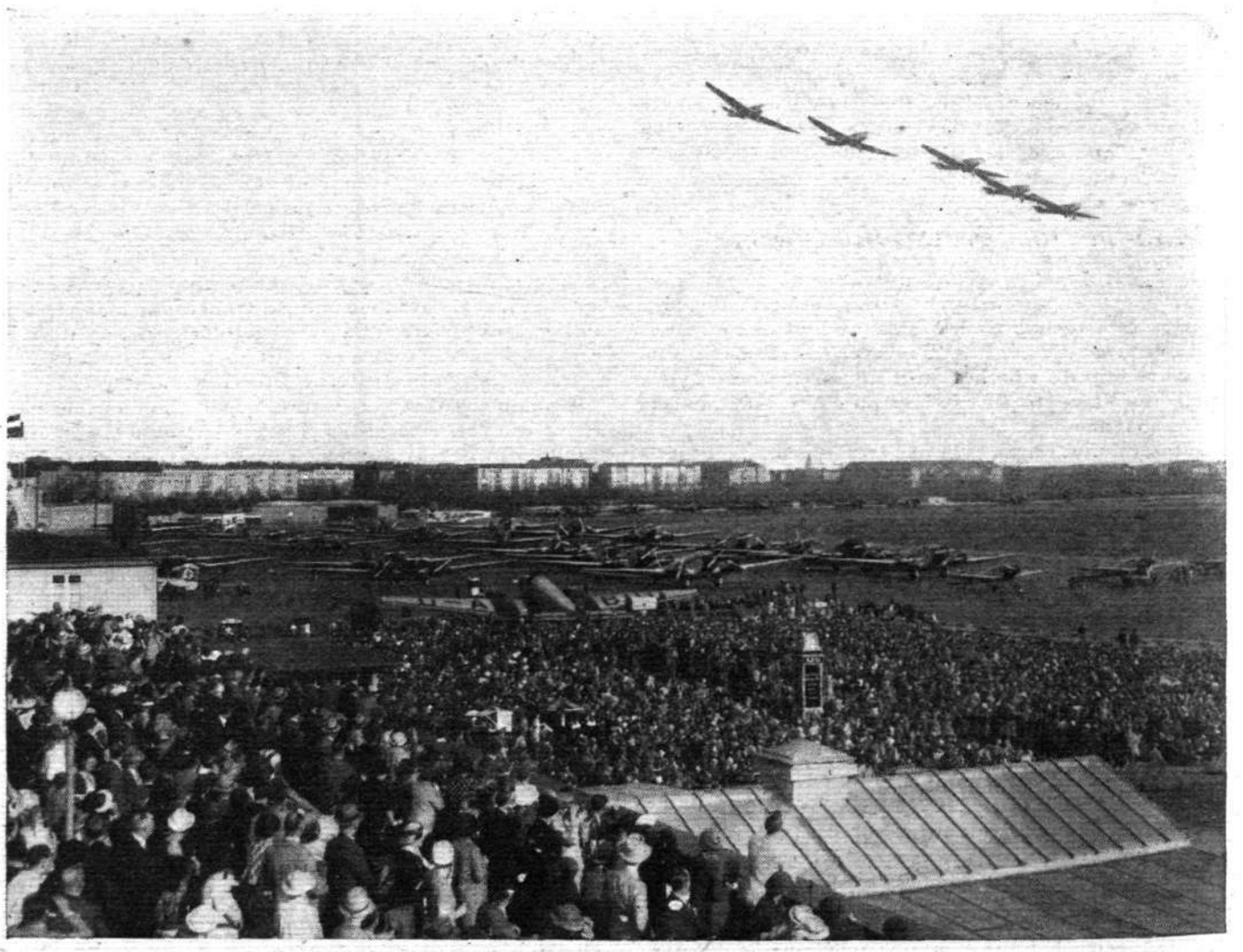
The best, it has been said, is the enemy of the good. No one will deny that to prevent war is the best that the League of Nations could do, but surely it would be good work to put an international ban on chemical warfare, and especially upon deliberate attacks on civilians. Even so, it might still be necessary for people to be practised in anti-gas drill in case the law were broken; but to accept gas bombing as a probable feature of war suggests that Europe is reverting to a state of society which not long ago was regarded as prehistoric.

Following the Flag

READERS of *Flight* do not need to be reminded of the old nautical saying that trade follows the flag. It is certainly true enough that where the white ensign has shown the way the red ensign has speedily followed. As regards air-borne trade, the saying is taking on a new meaning, for it has several times been the function of the Royal Air Force to explore the routes which it was proposed that commercial air transport should follow, should select aerodromes and landing grounds, or harbours and moorings as the case might be, and generally collect a mass of information for the benefit of the civil side. These facts are often forgotten by those who hold that civil flying has suffered by sharing with the Royal Air Force the attention and care of one Ministry.

The latest instance of the Royal Air Force being entrusted with the task of exploring a commercial air route concerns the Far East Command. No. 205 (Flying Boat) Squadron, which is stationed at Singapore, has just received three "Singapore 3" flying boats to replace its "Southamptons," and doubtless a fourth boat will be sent out in due course to replace the one so tragically lost in Sicily and to bring the equipment of the squadron up to establishment. With the old "Southamptons" this squadron did a great deal of exploration work in the Indian Ocean. With its new and more powerful aircraft it will certainly be able to do much more. Its first cruise with the "Singapores" will be straight across the Bay of Bengal from Singapore to Ceylon, with one halt for refuelling at the Nicobar Islands. This will be carried out next September. The return journey may be made up the Coromandel Coast to Calcutta, and then down the west coast of Burma and Tenasserim to Malaya. In Ceylon, contact will be made with the Tata air service which connects the island with Madras, Bombay and Karachi. Between Ceylon and Singapore there seems an opening for a commercial air route in the future, for Colombo is an important port, and its connections with Singapore are at present far from speedy. Ceylon is some 900 miles from the Nicobars, and on to Malaya is another 850 miles or so.

As was mentioned above, this survey by the Royal Air Force is no novelty. Before the war was over the Middle East Command, then under the late Sir Geoffrey Salmond, laid out the air route from Egypt to South Africa, now regularly used (with appropriate modifications) by Imperial Airways. The Royal Air Force in Iraq instituted the air mail between Baghdad and Cairo, and operated it for several years until Imperial Airways was ready to take it over. When political considerations obliged Imperial Airways to change its Persian Gulf route from the Persian to the Arabian shore of the gulf, the "Rangoons" of No. 203 (F.B.) Squadron from Basra flew up and down the Arabian Coast and collected all the data for the new route. The R.A.F. has also surveyed the route from Singapore to Hong Kong.



BERLIN LOOKS SKYWARD: The annual "People's Flying Day" was celebrated at Tempelhof Airport last Sunday, and this time the open possession of an air force added to the spectacular nature of the event, which was combined with "Air Force Day," the anniversary of Richthofen's death. The formation seen in this photograph is a very non-aggressive one of Klemm monoplanes.

The Outlook

A Running Commentary on Air Topics

Flying Value

FIVE years ago the comparatively small number of subsidised clubs suffered from such a dearth of aircraft that members could do little more than make circuits of their aerodrome and practise forced landings or aerobatics in its vicinity. To-day the more prosperous clubs can allow accredited members to make day cross-country trips—with a consequent increase in effective flying hours.

Even so, the position is still a delicate one, and it might ultimately be a paying proposition if every large club put one machine on one side for fly-yourself charter work over any reasonable period of time and on condition that the hirer put in or paid for a minimum number of hours on each day of the contract. The average safe but not very experienced pilot would probably prefer, for such work, to use a machine to which he was accustomed; and an instructor is always most capable of deciding whether a particular novice is likely to be safe when dealing with a strange aerodrome or field in case of a sudden onslaught of bad weather. Furthermore, the prospective hirer would be able to calculate his all-in expenses to a nicety.

Meanwhile, a concern which concentrates on personal hire business is doing great work for pilots who cannot afford to own an aeroplane yet who prefer to use this vehicle for long-distance holiday or business travelling. Cross-country experience is as important as the mere ability to obtain an A licence, and is, one feels, as deserving of assistance—until such a time as the tax on fuel for aviation purposes is removed.

Training the Prospective Owner

STEADY and regular cross-country work in a hired machine and in fair weather is the best possible preliminary to ownership. Doubtful at first of the value of a light aeroplane, a pilot, after a year's such useful flying, will know exactly whether business and pleasure flying time would be likely to justify the purchase and upkeep of his own machine.

If a private pilot, after ten or twenty hours' flying, buys his own machine, he often finds that, during the first year, his hourage hardly justifies the all-in cost, and he may leave the ranks in a moment of depression. He may even, away from the continued care of an instructor, incur unnecessary expenses as a result of a series of really heavy landings or of a misjudged forced landing.

As a member-hirer he would be compelled to undergo frequent instructional checks during his probationary period, and, before finally becoming an owner, would have passed through the dangerous stage. The best of pilots has his "off" days but longer experience enables him to reduce the effects of poor landings, for instance, with judicious bursts of throttle.

Useful Ownership

WHEN the last word has been spoken and the satisfactions of ownership have been fully extolled, the fact remains that in this climate of ours only the full-time pilot, with a fully equipped machine, is capable of making proper all-the-year-round use of aviation. The busy man, who treats his aeroplane as an exceedingly swift and comfortable method of keeping distant appointments, will continue to demand the services of a professional pilot and of a multi-engined machine with radio and blind-flying equipment.

In a comparatively prosperous country the numbers of such owners should increase.

Nevertheless, between the months of March and November the less prosperous private owner can, with the help of meteorological telephone calls, cover a great deal of ground while flying himself in a thousand-pound cabin aircraft. As more aerodromes are available the still unreasonably small number of owners should progressively increase.

Nowhere to Land

NOWADAYS it is customary to hear plaints, pitched in various keys, from municipal enthusiasts who, having encouraged their town to spend a comparatively large sum of money on an airport, now find that no aeroplanes, large or small, land thereon. It is not so usual to hear air line operators complaining patiently that, having planned a route to some important city, they now find that aeroplanes cannot land there.

Edinburgh has no municipal aerodrome and it rather appears as if it never will have one. There is a small private aerodrome about twelve miles away on the east side, but this is not large enough for fast commercial types, and the Air Ministry, naturally enough, will not permit the use of Turnhouse—at least until the city shows a willingness to do something for itself. North Eastern Airways' service, meanwhile, stops at Newcastle and thereby loses half its value as a high-speed connection.

Just at present, of course, many municipalities are waiting for the Government to do something about planning and/or subsidising suitable aerodromes, and until they say "Yes" or "No" plans are held up and sites are lost. What is the Aerodromes Advisory Board doing about it?

Thinking as a ratepayer rather than as an air line enthusiast, it *is* difficult to justify a heavy expenditure on an aerodrome which may or may not become an important air line centre. The time has come to plan the perfect internal air route system.

The Pacific Project

IT sometimes appears that (*a*) oil pipe lines and (*b*) air lines may eventually cause quite a deal of trouble in this world. At the present time oil is becoming more and more vital to transport and what is known as Western Civilisation holds the key to the entire supply. But some day we shall look up and see something (under the heading *b*) much more serious to worry about.

America is forging across the Pacific while Japan sees in the necessary island bases the nuclei of a vast scheme for Pacific and Far Eastern domination.

In the meantime, the Pacific project is a stirring one and the production of a flying boat which will cruise nonstop for more than three thousand miles with twelve passengers and mail is something of which America may be proud. These things move in cycles inasmuch as, having bought a fleet, a company such as Imperial Airways can-

not afford to scrap it until it has done some five years' work, and there is, therefore, no immediate call for faster or better machines. When the big boat, at present on the stocks for Imperials, eventually appears, it will doubtless show improvements on both the Sikorsky and the Martin.

Future of Gliding

GLIDING is in the news again. Miss Meakin is to tour the country with Sir Alan Cobham's Display and show thousands of people what gliders can do when used for stunt flying, and Mr. Slingsby reports increased interest in the manufacturing side.

All this is to the good. The gliding fraternity, however, do not appear to have settled all their differences so that agreement can be come to with the Air Ministry for the distribution of the £5,000 per annum which was set aside last year.

When that is done we hope that gliding—or to be more correct, soaring—will be recognised for its potentialities as a means of meteorological research. It would be a great encouragement to the members of a keen body like the London Gliding Club (who probably do 70 per cent. of the soaring in this country) if a prize were offered for the best annual meteorological report of a long-distance flight. Reports of this nature would be of considerable benefit to all forms of flying. Another way in which gliding could be encouraged would be the recognition of the value a soaring course would be to *all* pilots, for it is possibly true that a pilot of power-driven aircraft who is a soaring pilot is better than one who is not.

Ailerons or Rudder?

EVERYBODY seems to agree that simplification of aircraft controls is a desirable or even necessary development if people by their hundreds are to engage in flying as a popular pastime. So far no one has suggested any remedy for the admittedly rather complicated and "non-instinctive" control system of the orthodox aeroplane other than the abolition of one of the present controls. But opinions are a good deal divided when it comes to deciding which should be abolished. The elevator is indispensable. It is the "gear box" of the aeroplane, in that, used in conjunction with the throttle, it enables the machine to maintain level flight at any speed within its range, from maximum to minimum. Obviously, the elevator cannot be eliminated, although it might be reduced in power to prevent stalling angle being reached. There then remain the rudder and ailerons.

In these pages we originally suggested that possibly the ailerons might be omitted, giving the wings an ample dihedral angle and relying on the rudder to bring up a wing that had dropped, as M. Henri Mignet does in his "*Pou-du-Ciel.*" Another suggestion was that the rudder might be turned into an immovable fin, and all turning done with the ailerons. It was pointed out that several modern machines are so designed that there is rarely any real need to use the rudder. Flt. Lt. Christopher Clarkson is certainly better entitled than most to express his views, and this week he returns to the subject in our Correspondence columns, pleading for the abolition of the rudder, and suggesting that split trailing-edge flaps may suffice.

Why Not "Lift Spoilers"?

THE use of split trailing-edge flaps at the wing tips does not appeal to us as a good solution. Although the split flap increases the lift, and would thus doubtless bring the wing tip up, it also increases the drag, and would probably lead to the same sort of troubles as the normal aileron. A split trailing edge, in which one flap moved down and another up, sounds an interesting combination, but the results of tests made in America (see p. 25, *The Aircraft Engineer*, in this issue) are not over-encouraging. In connection with a slotted wing, the Handley Page company has found "interceptors" or "lift spoilers" effective in bringing the rising wing down.

We would suggest that such lift spoilers on an unslotted wing might be used for directional control as well as for banking. The lift is reduced and the drag increased when the "interceptors" are raised from the wing surface, and a yawing force of the right sign would thus accompany the rolling moment. It should be possible so to proportion these surfaces that correct banks were always made. Even in connection with the "*Pou-du-Ceil*" wing arrangement these "interceptors" might be used instead of using the rudder. M. Mignet admits that while fore-and-aft and lateral stability are excellent at all speeds, and the rudder control good at all normal speeds, when it comes to stalled flight, of which the "*Pou-du-Ciel*" is capable without going into a spin, the rudder becomes "soft" and not very effective. "Interceptors" might do the trick.

An Aspect Ratio of One

BY a somewhat curious coincidence we publish this week general arrangement drawings of three unorthodox aircraft types in which the ratio of wing span to wing chord, or aspect ratio, is very small. M. Mignet uses a very short span in his "*Pou-du-Ciel,*" as his system of control without ailerons does not work well on wings of high aspect ratio. Two other foreign designers, one American and the other Italian, have recently produced designs in which the wing area is nearly "square," i.e., the distance from front to back of the wing is approximately the same as that from wing tip to wing tip. In all cases quite good aerodynamic efficiency is achieved, or at any rate claimed.

It will be interesting to see whether this complete breakaway from the wing of what has become ordinary aspect ratios will lead to any permanent influence on aircraft design in general. The experiments are at least worth watching, and it is wise to keep an open mind.

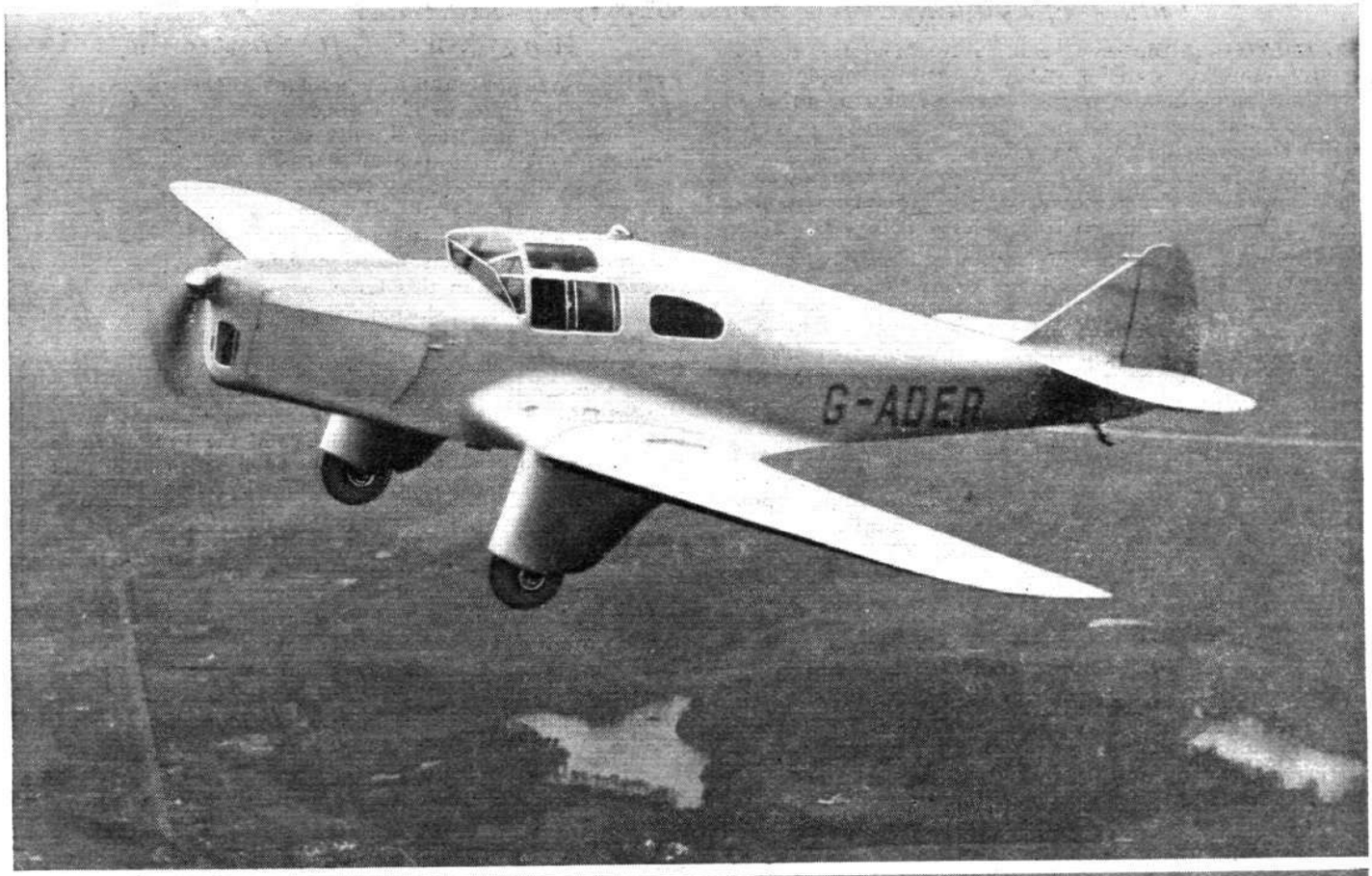
Forthcoming Events

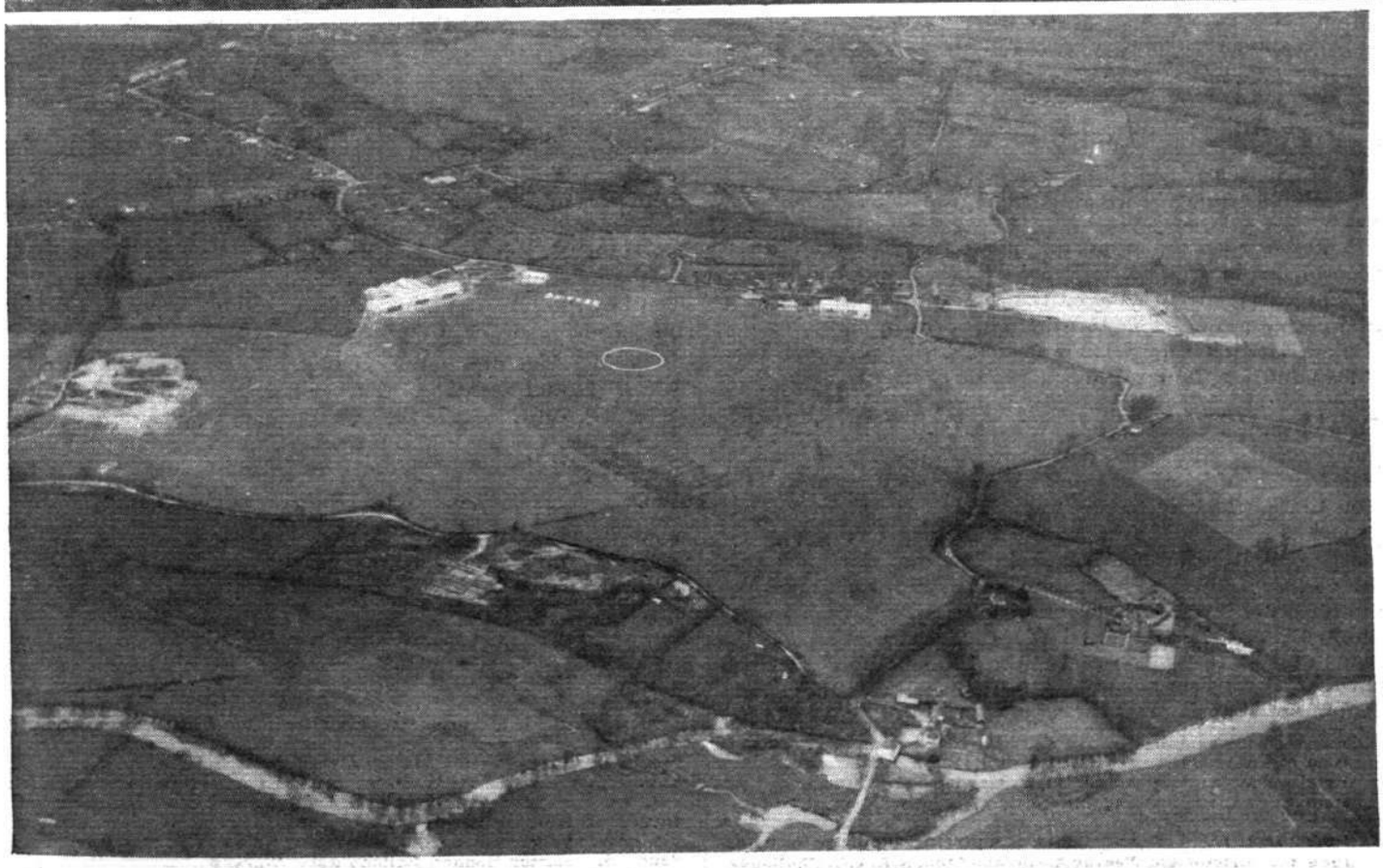
Club Secretaries and others are invited to send particulars of important fixtures for inclusion in this list.

May 5. R.Ae.S Garden Party, Fairey Aerodrome, Great West Road.
May 11. Aviation Day, Phoenix Park, Dublin.
May 19. Deutsch de la Meurthe Cup, Aero Club de France.
May 23. Jubilee Air Ball, Air League of the British Empire, at the Dorchester Hotel, London.
May 25. Empire Air Day, Air League of the British Empire.
May 29. Household Brigade Flying Club. Night-Flying Demonstration, Heston
May 30. Wilbur Wright Lecture, by Mr. Donald W. Douglas, Science Museum, South Kensington.
June 1. Brooklands "At Home."
June 1-15. Lisbon Aero Show.
June 8. London Aeroplane Club. Garden Party, Hatfield.
June 8. Official opening and garden party, Witney and Oxford Aero Club.
June 15. R.A.F. Flying Club Annual Display, Hatfield.
June 15. Bristol and Wessex Aeroplane Club, S.B.A.C. Challenge Cup, Whitchurch.
June 16. Scottish Flying Club Display, Renfrew.
June 29. Royal Air Force Display, Hendon.
July 1. S.B.A.C. Display, Hendon.
July 6. Royal Air Force Fly-past before H.M. the King at Duxford.
July 13. Opening of Leicester Municipal Airport.
July 20. Opening of Brighton, Hove and Worthing Municipal Airport, Shoreham.
July 28. Private Owners' Garden Party. Ratcliffe, Leicester.
Aug. 17. Round the Isle of Wight Air Race and Portsmouth Air Trophy.
Aug. 24-25. Third International Flying Meeting, Lympne.
Aug. 24-25. Cinque Ports Club. International Flying Meeting and Wakefield Cup Race.
Sept. 6-7. King's Cup Air Race.
Sept. 14. Cinque Ports Club. Folkestone Aero Trophy Race.
Sept. 15. Gordon Bennett Balloon Race, Warsaw.
Oct. 12-28. International Aircraft Exhibition, Milan.

CRADLED at READING

A "Falcon" and its Birthplace

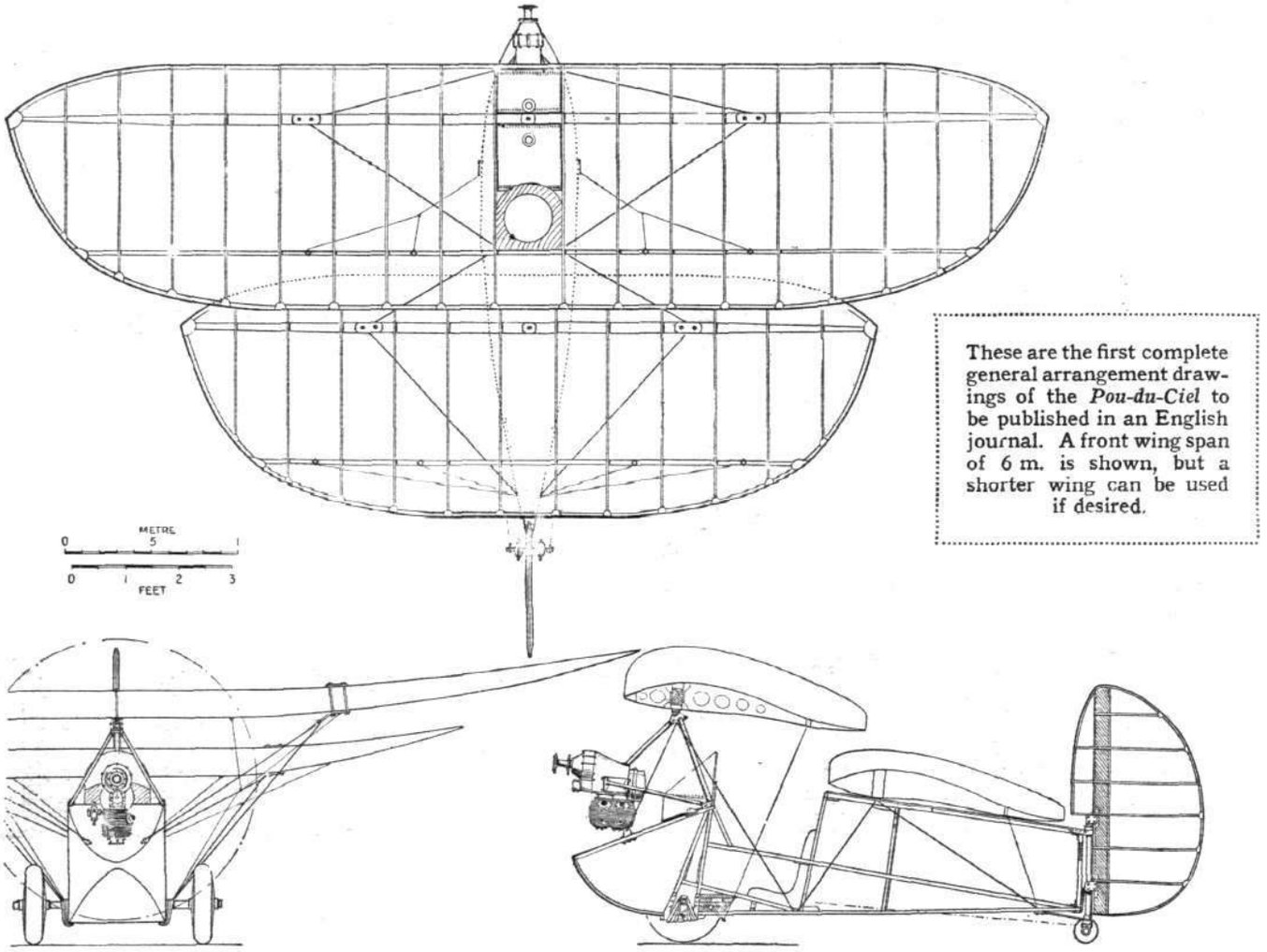




One of the first batch of production-model Miles "Falcons," taken last week-end by a *Flight* photographer over Reading Aerodrome, where the makers' works are situated, and which is the home of the Reading Aero Club. The engine of the "Falcon" is a 130 h.p. "Gipsy Major" and the cabin seats three passengers and a pilot in comfort.

PAVING the WAY for the "POU"

"The Pou Club" and British Constructors : An Engine Difficulty : Wheels Too Expensive : The Supply of Materials



These are the first complete general arrangement drawings of the *Pou-du-Ciel* to be published in an English journal. A front wing span of 6 m. is shown, but a shorter wing can be used if desired.

THINGS are beginning to move in the *Pou* World. Some time ago we announced, following a suggestion made by a *Flight* reader, the formation of "The Pou Club" within the Air League of the British Empire, Air Comdre. J. A. Chamier, C.B., C.M.G., D.S.O., O.B.E., Secretary-General of the Air League, appointing himself as first president and committee.

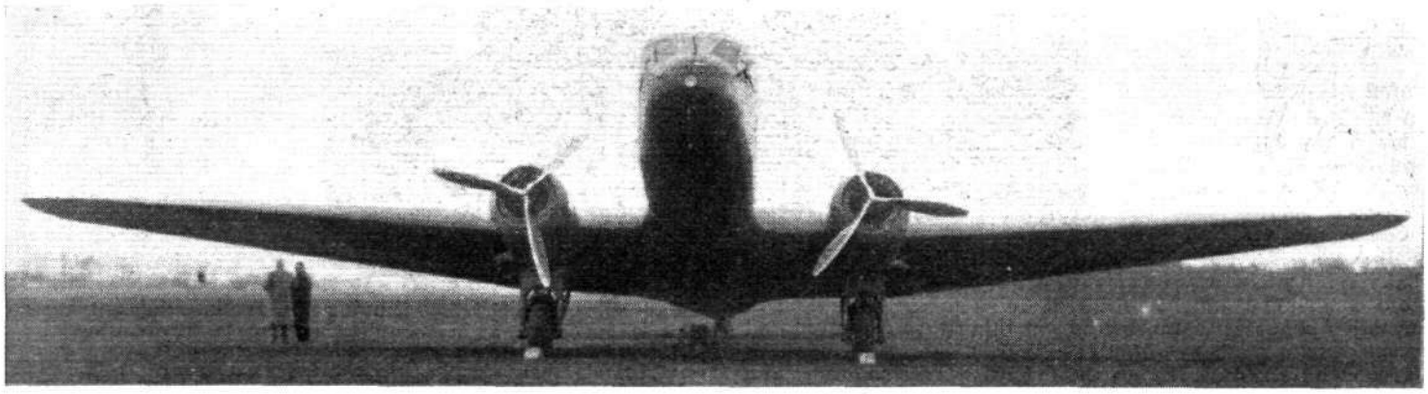
Negotiations with M. Henri Mignet, the designer of the "Pou-du-Ciel," and author of the book *Le Sport de l'Air : pourquoi et comment j'ai construit le Pou-du-Ciel*, have been begun, and will, it is hoped, lead to better information and greater facilities becoming available to potential British builders of the *Pou*. In the first place, the Pou Club, which is to say Air Comdre. Chamier, has approached a publishing firm with the object of bringing out an English translation of the constructional chapters of M. Mignet's book. In the second place, the Club has obtained quotations from a number of British firms for the different materials required for the construction of the machine. In the third place, the Club has got in touch with a British firm concerning the marketing of a suitable engine at what is regarded as a reasonble price. Here it might be pointed out that engines are already in existence which would probably suit the *Pou*, such as the A.B.C. "Scorpion" of 34 h.p., and the Douglas motor cycle engine fitted in the B.A.C. "Drone," which is of some 17 b.h.p. The former is rather more powerful than necessary, but would probably give the machine a very good take-off, while the latter is a little under the power used by M. Mignet, a more serious objection to its use being, perhaps, that it is direct-drive, and cannot, therefore, be expected to give quite as good a take-off as M. Mignet's geared Aubier-Dunne two-stroke.

To make an English text of M. Mignet's constructional chapters available quickly, it has been decided, pending the publication of the English book, to translate the essential chapters into English. This work will be done by the Pou Club for the benefit of its members, who are advised to obtain the original French book for the sake of the drawings and sketches. This will enable them to get on with the work, even if they do not read French. A charge of 7s. 6d. is made for the translation. This amount will go towards the price of the English book when it is published. Should negotiations with the publishers fall through, the amount will be retained by the Pou Club as the translation fee. And, finally, should M. Mignet object to English translations of some of his chapters, the money will be returned, and the expense incurred will be "written off" as part of the Air League's service to the Pou Club. All of which sounds complicated and rather as if the Pou Club had failed to make proper arrangements with M. Mignet.

A list of prices of materials for the *Pou*, obtained by the club from manufacturers, indicates that it should be possible to buy all wood, tubing, sheet, bolts, fabric, etc., for approximately £25. The two largest items, as might have been expected, have proved to be the engine and the wheels. It is expected that a suitable engine may be available for a price of approximately £60. A well-known firm has quoted £4 13s. 6d. per wheel and tyre, which seems rather expensive in view of the fact that serviceable wheels can be bought in France for about 25s. each.

VARIATION on a THEME

The Breguet-Wibault 670, Although Built to the Modern Formula, is no Slavish Copy of Successful Designs



MANUFACTURERS' trials of the new Breguet-Wibault Type 670 eighteen-passenger commercial monoplane are almost completed, and the machine will shortly be presented at Villacoublay for official tests.

It is a low-cantilever-winged monoplane of metal construction throughout, and may be regarded as an enlarged and improved development of the Breguet-Wibault Types 282 and 283 triple-engined machines which have met with great success on the European lines of Air France.

Of typical Wibault form, the cantilever wings are built in three sections—a centre section and two outboard panels. The centre section, which carries the two engine mountings, is of a uniform thickness; the outer panels taper down to a chord of 5 ft. 8 in. at their tips, and their thickness also is much reduced. Duralumin sheet fillets fair the junction of the wings with the fuselage. Structurally the wing is of two-spar type, with spar webs built up of sheet duralumin, and embodying extruded flanges. The covering is of duralumin. Slotted ailerons extend for approximately two-thirds of the wing span, the balance of which is taken up with slotted trailing-edge flaps.

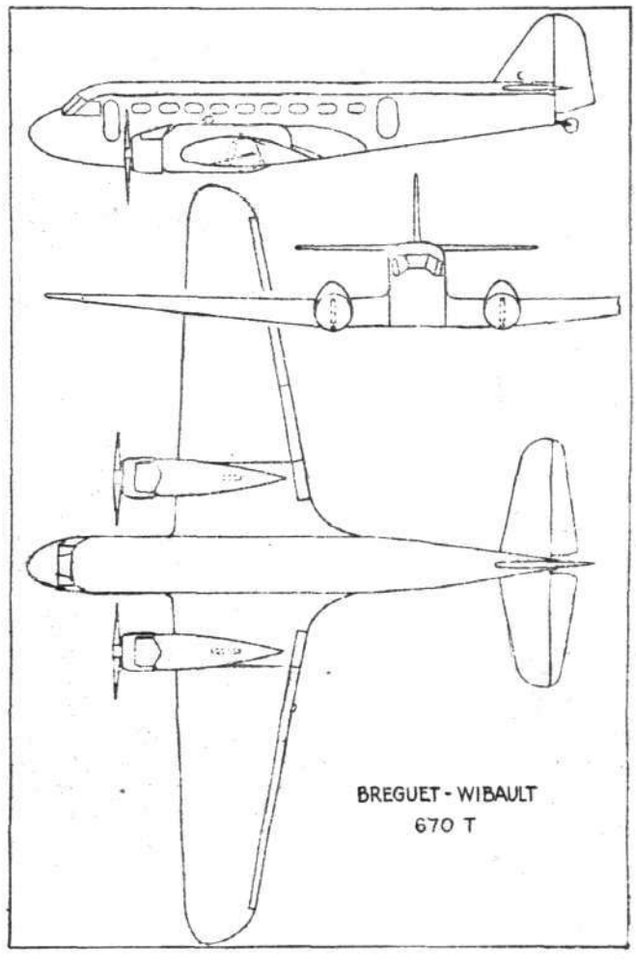
In the main the fuselage is of rectangular section, although the nose portion is well rounded. The complete structure, with its covering, is of duralumin. In the nose is the pilot's cockpit, furnished with dual controls, and aft of this is a position for the wireless operator. The cabin has chairs for eighteen passengers, arranged in two rows of nine, each chair being placed beside a window. Soundproofing and ventilation have been carefully studied, and the cabin is by no means cramped, measuring 5 ft. 9 in. high and 5 ft. 6 in. wide An entrance, a lavatory and a baggage hold are located aft of the cabin.

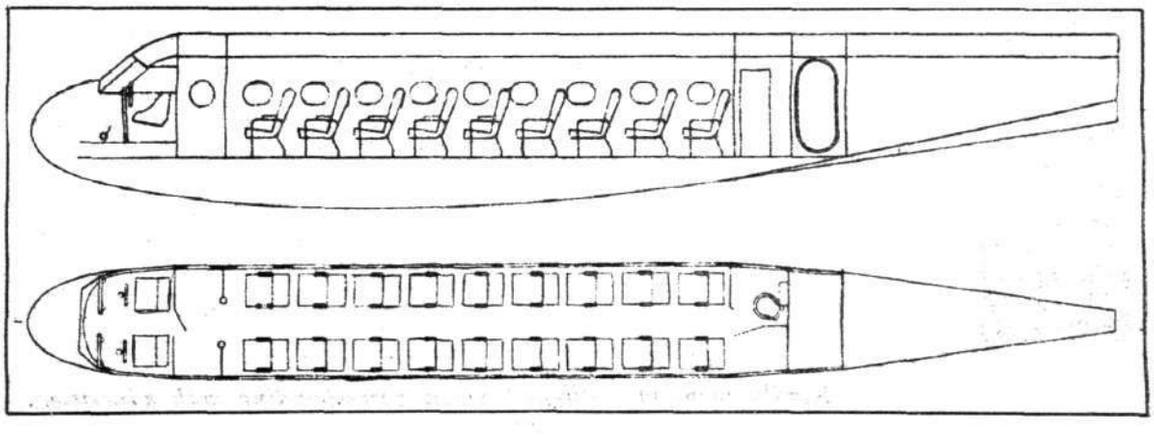
Power is furnished by two Gnome-Rhone "Mistral Major" or K 14 two-row fourteen-cylinder radials, geared 3 2 and moderately supercharged to produce 900 h.p each at 4 500 ft.

The retractable undercarriage is of Breguet design, with each compression unit composed of a pair of shock-absorbing struts, disposed one on each side of the wheel.

The general characteristics are as follows:—

Span, 80 ft. 9 in. (*24,86 m*); Length, 60 ft. 9 in. (*18,74 m*); Height, 23 ft. 5 in. (*7,2 m*); Wing area, 846 sq. ft. (*78,6 m²*) Gross weight, 19,800 lb. (*9 000 kg*); Range, 625–1,250 miles (*1 000 km–2 000 km*); Maximum speed at 5,000ft (*1 500 m*), 219 m.p.h. (*350 km/hr*); Speed at 62½ per cent. full power, 186 m.p.h. (*298 km/hr*).





That the new Breguet-Wibault's maximum speed is 219 m.p.h. can be well believed after a glance at the heading photograph and the general arrangement drawings. The cabin plans show the wide gangway and the position of the lavatory and doors.

COMMERCIAL AIRCRAFT DISCUSSED

Points of Interest from the Discussion on Capt. De Havilland's Recent Paper

THE discussion which followed the paper on commercial aircraft which was read by Capt. De Havilland before the Royal Aeronautical Society on April 15 (and given in *Flight* last week) produced some views somewhat widely divergent from those of the lecturer, but on the whole did not in any way alter the general position.

Major F. M. Green suggested that, according to his interpretation of Capt De Havilland's paper, the "Comet" would show a better ton-mile per gallon figure if it were cruised at 10 m.p.h slower whereas according to his (Major Green's) theories, it could profitably be cruised at an even higher speed

Mr. Stanley Evans of Heston Aircraft, Ltd., did not think that Capt. De Havilland was justified in saying that there was more commercial and unsubsidised flying in England than in any other country. Also he did not think that the rapid and recent development in American aircraft design could be attributed to any great extent to the extensive mail contracts and other forms of subsidy which they had received. He felt that we had a very great deal to learn from American practice.

Night Flying

Mr Nigel Norman pointed out that the extensive use of night flying by permitting a larger number of flying hours and therefore ton-miles to be achieved by operators, would enable them to pay more for their aeroplanes in the first place, and therefore to get better aircraft He asked what extension in range would result if, as Capt. De Havilland suggested, the present take-off requirements were abandoned and the existing class "A" minimum runway, that is, 1,000 yards, were doubled.

Dr. Watts, of The Airscrew Co., Ltd , did not think that people were justified in somewhat sweepingly saying that any aeroplane would be improved by the substitution of variable-pitch for fixed-pitch airscrews. Each case must, he felt, be judged on its merits. Furthermore, he felt that people were somewhat too prone to say that the blades of a fixed-pitch airscrew were stalled during the take-off, and he felt that variable-pitch airscrews did not really become necessary until the pitch became something like one and a third times the diameter. He also remarked on the weight of variable-pitch airscrews—weight, which he said, could better be used for passengers.

Capt. F. S Barnwell, of The Bristol Aeroplane Co., suggested that there was no great gain when cruising by using a variable-pitch airscrew He looked upon it as rather an unpleasant necessity. He thought that in the larger sizes a high-wing monoplane was better than a low-wing, both for efficiency and from the point of view of the passengers.

Ton-Miles

Major R. H Mayo thought that Capt De Havilland could in achievement justifiably be called "the grand old man of British aviation," although everybody would understand that he really was one of the youngest. Concerning the question of ton-miles as a criterion of a machine, Major Mayo pointed out that with certain ground organisation it is not always possible to fit in services so that the maximum number of ton-miles per gallon can be used.

Mr. F. M. Thomas (who is designing Hamilton variable-pitch airscrews at De Havillands) thought that the question of stalled blades was a very complex one which had to be considered very carefully for each individual machine. He pointed out that although variable-pitch airscrews were certainly far too heavy, there was no question of sacrificing load capacity due to their use, as they were in themselves a means whereby a larger load than before could be got off the ground in the same machine.

Mr. F. Duncanson of the Blackburn Aeroplane Co , agreed that we had a lot to learn from American principles, and thought that the increased aerodynamic cleanliness of modern aeroplanes was also a means whereby higher ton-mile per gallon figures were being achieved.

Mr. F. Radcliffe, of Airspeed (1934), Ltd., asked for better ground organisation, particularly in the matter of getting passengers to and from aerodromes when on the ground. He also thought that too much emphasis was laid by Capt. De Havilland on the question of windows and a view for passengers, as he thought that with machines flying at 10,000 ft. the view would be of no consequence.

Mr. C. C. Walker (chief engineer of the De Havilland Aircraft Co.), answering some of the queries, said in reply to Capt. Barnwell that the curves were derived from the result of full tests and carried out by the N.A.C.A. In reply to Dr. Watts, concerning the horizontality of the F.P. curve in Fig. 8 of the paper, he said that the curves were prepared from data derived from N.A.C.A reports. Answering Major Mayo, he did not agree that the span as used in Fig. 2 as a measure of frontal area was incorrect, as he thought span affected the questions wrapped up with frontal area more than any other factor. In reply to Mr. Duncanson he said that the equivalent monoplane span used in Fig. 1 in the case of the biplanes was approximately the span of the top plane, plus one-eighth of the span of the bottom plane.

Capt. De Havilland, continuing the replies, did not agree with Major Green, as he thought that high landing speeds were quite all right. All the De Havilland test pilots had flown the "Comet" with its wing-loading of 26lb. per sq. ft., and all of them had found it quite easy. In reply to Mr. Stanley Evans, he still maintained that there was a very great deal of private and commercial aviation in this country which was unsubsidised, and also that the progress in the United States was very largely due to the large contracts they had received from the Post Office which gave their machines so much work that they were able to use the type of aircraft which they wanted.

Ideal Aerodromes

He agreed with Mr. Nigel Norman about the need for night flying and good aerodromes, and thought that what was wanted in the first place was not so much more aerodromes, but better aerodromes. Four miles of arterial road laid out in the correct manner would, he said, give them the best aerodrome they had in the country. With regard to Dr. Watts' remarks, he said that their experience showed that the "Dragon Six" travelled sufficiently fast to make the question of stalled blades with fixed-pitch propellers begin to look serious. He did not agree with Capt Barnwell that there was no advantage at cruising speed with variable-pitch airscrews, as the advantage lay in the fact that the cruising r.p.m. could be chosen beforehand.

Answering a query by Mr Radcliffe, he said that investigations undertaken during the design of the "Comet" showed that supercharging the engines did not pay when long range was wanted unless extra power could be used for the take-off. He certainly did not agree that windows were not wanted, particularly when flying abroad, where the visibility was usually good.

Col. Moore-Brabazon, who was in the chair, reminded the audience that it was twelve years since they had had the pleasure of hearing Capt. De Havilland, and he hoped that it would not be so long before they heard him again.

Empire Air Day : Civil Aerodromes Open to the Public

Apart from the Service aerodromes which, as detailed in *Flight* of April 11, will be open to the public on Empire Air Day, May 25, practically all the civil aerodromes in the country are making special arrangements to entertain the public. In many cases joy-riding will be offered at reduced rates, especially so to those wishing to make their first flights—but the Air League does not tell us how it will be determined that these people have never flown before!

The following have signified their intention of co-operating:—

Heston (features will include four-shilling flights by Capt. Birkett in a Short "Scion" loaned by the makers), Hanworth, Croydon (50 per cent. reduction on ordinary fares offered to "first-flighters" by Provincial Airways, Ltd.; this will also apply to their provincial ports of call—Plymouth, Southampton, Portsmouth Torquay and Hull), Brooklands (Hawker Co. co-operating), Reading (Phillips and Powis works open), Bristol (possibly a race for S.B.A.C. Challenge Trophy), Whitchurch (Gloster Co.'s aerodrome will probably be open), Southampton, Portsmouth, Canterbury, Lympne, Tunbridge Wells, Manchester, Liverpool (2s. 6d. flights), Leicester, Newcastle (Cramlington), Norwich, Nottingham (2s. 6d. flights), Witney, (3s. first flights), Redhill, Ipswich, Leeds and Bradford (Yeadon), Brough, Doncaster (Crilly Airways, Ltd. offering 10 per cent. reduction for first flights), Leamington, Inverness (2s. 6d. flights in Highland Airways "Dragon.").

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

Danish "Gauntlets"

The Gloster "Gauntlet" single-seater fighter with 605 h.p. Bristol "Mercury VI S" engine has been adopted by the Danish Military Air Force. A batch is soon to be constructed, under licence, in Denmark.

Home Again

The Duchess of Bedford and her pilot, F/O. Preston, returned from their African flight last Friday.

Miss Batten's Flight

Miss Jean Batten, when she arrived at Baghdad on Monday in the course of her return flight from Australia to England, was slightly behind schedule, but still hopeful of a two-way record.

Miniature International Event

Over 200 models were entered for the annual model aircraft contest for the Coupe de France held at Vincennes last week-end. Machines taken over by a party of British enthusiasts gained three prizes.

Third Time Unlucky

Flying, *sans* undercarriage, in his evergreen *Winnie Mae*, that determined pioneer, Wiley Post, has, for a third time, been forced down while attempting a Transcontinental record-breaking stratosphere flight.

Playing Their Aces

The names of great war-time fighting pilots are being allocated to new German military squadrons. Already Richthofen, Immelmann and Boelcke have been thus honoured. Doubtless it is hoped to instil the skill and spirit of these heroes into the new units.

Shades of the "Salamander"

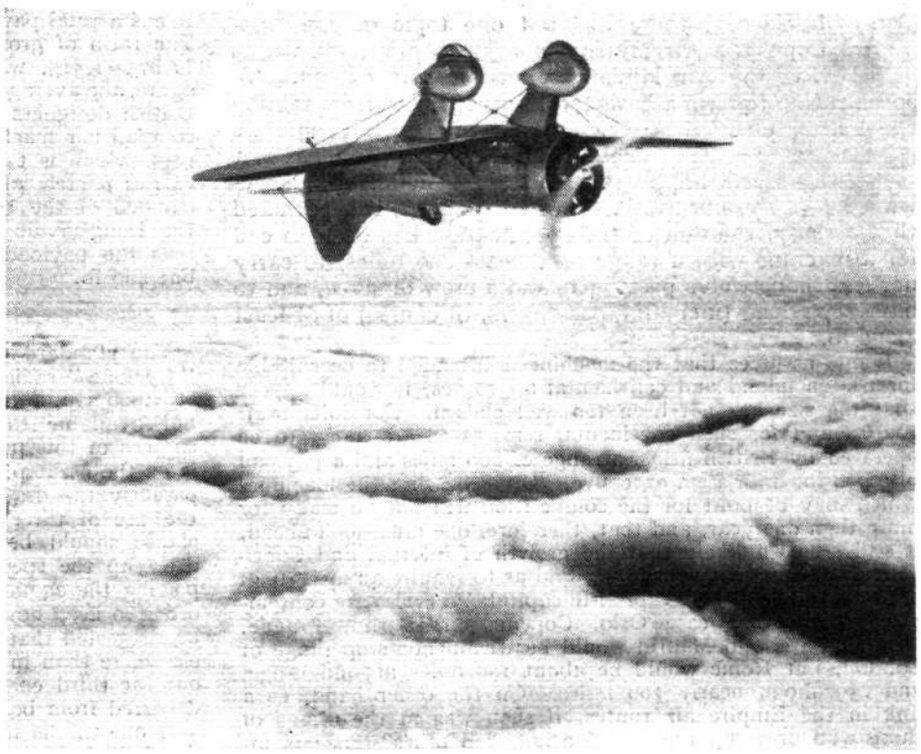
Among the forty Hawker two-seater bomber-fighters ordered by South Africa will be two armour-plated versions. They are intended, it is said, for "getting close to any disturbance without causing unnecessary casualties to the side taking disciplinary action or to the disturbers of the peace."

A Crash Landing

Mr. Gwynne Johns, an Aberystwyth clerk with designs on the delayed parachute drop record, was prevented from jumping from 20,000 feet over Salisbury Plain last week by bad weather. Later, while making a drop from 1,500 feet at Reading, he was carried by a strong wind and broke his leg on landing.

Big and Bad?

For fifteen hours a balloon which has ascended near Moscow was borne by strong winds over the Russian countryside, and eventually came to earth in the midst of a pack of wolves, which proceeded to attack its two occupants. Luckily they managed to reach the safety of a peasant's home.



LOOKING UP AT THE CLOUDS BELOW : While airing and exercising his fascinating little Gee Bee "Sportster," Jack Weymann, a Chicago stunt pilot, makes a study of a strato-cumulus bank.

Famous French Pilot's Death

The famous French pilot Maurice Finat met his death last Sunday during the course of an attempt on the Madagascar-Paris record. His Farman was caught in a squall and forced into the slopes of Mount Kilimanjaro (19,720 ft.), Tanganyika. He was accompanied by another pilot with a distinguished war record, the Comte de Forges, who was seriously injured.

The R.Ae.C. Garden Party

Among the features of the R.Ae.C. Garden Party, to take place at the Fairey Aerodrome on Sunday, May 5, is a collection of photographs of famous aircraft from 1909 to 1934. There will also be what is described as one of the most remarkable demonstrations of fire-fighting ever given in public. The Northrop bomber from Farnborough will be among the many visiting aircraft.

Twenty-five Years Ago

From "Flight" of April 23, 1910

"In the works of Pega and Emirch, at Griesheim, there is under construction at the present time an enormous aeroplane, which has been designed to carry six to eight persons, and to be capable of remaining in the air for five hours at a stretch. It is fitted with six main planes, while the motor is of 80 h.p."

The Empire's Air Day

Empire Air Day is being observed in the Empire as well as at home. On May 24 the Rand Flying Club will hold an exhibition of aircraft at Germiston, assisted by the South African Air Force, Imperial Airways, and other organisations, while Johannesburg, Calcutta and, possibly, Lahore, are planning events to mark the occasion.

Aerial Pilgrimage

An aerodrome is to be constructed 10,000 feet above sea level in the Himalayas by the Indian Air Transport Company to facilitate the transport of pilgrims to Badrinath, one of the holiest Hindu shrines. When the aerodrome is completed the journey to Badrinath will take about twelve hours instead of from six to eight weeks, as formerly.

Smoke and Visibility

The effect of smoke on flying is to be considered by a special conference which has been arranged by the National Smoke Abatement Society, to take place in London on May 30. A prominent part is expected to be taken by local authorities in view of the rapid development of municipal aerodromes, and the aim of the conference is to collect evidence on the way in which the smoke, by obscuring landmarks, reducing visibility, and promoting foggy conditions, constitutes an impediment to flying operations.

A PRIZE and a PUZZLE

The Air Ministry's £25,000 Award : A High-performance "General-purpose" Type Aimed at : Is the Specification on the Right Lines?

WHEREVER aeronautical folk foregathered during last week, there was but one topic of conversation: the Air Ministry's £25,000 prize. It seems that the Air Ministry issued a sort of tentative specification to form a basis for discussion, and from talking the matter over with a number of interested people we gather that on the whole the draft specification has not met with universal approval. While full details are, somewhat naturally, not available for the present, it is gathered that, briefly, the aim of the specification has been to call for a machine with a range of at least 800 miles, to carry not less than twelve passengers and a crew of three, and to have a payload (including passengers, of course) of at least 4,000 lb.

If one assumes that the machine is intended to be suitable for use on inland and continental air routes, it would appear that the size has not been too well chosen. For inland air routes, and for such continental services as are likely to be operated by British firms, a range of 800 miles and a payload of 4,000 lb. both seem excessive. Granting that the machines which may be built for the competition will not be ready for more than one year, and that, therefore, one must look ahead, it still seems unlikely that the growth of internal and Continental air transport will be so rapid as to require an aircraft of such capacity unless "capital-to-capital" services are contemplated. In that case Oslo, Copenhagen, Berlin, Prague, Vienna, Paris and Madrid would be within non-stop range of London, but Rome would be about 100 miles beyond range, and Stockholm nearly 200 miles. On the other hand, as a link in the Empire air routes, if such was in the minds of those who drew up the specification, 800 miles' range is insufficient to give the possibility of "all-red route" operation.

Twelve Passengers

As far as can be gathered the draft specification definitely calls for at least twelve passengers, and not their equivalent in other payload, so that it does not appear to be permissible to add materially to the range by sacrificing a proportion of the payload. It is difficult to see the need for 800 miles range on any possible internal air routes within the British Isles, and unless the designer be permitted to exchange fuel for payload for internal air-route work, the type of machine visualised is scarcely likely to have a wide appeal.

Some weeks ago *Flight* suggested that the competition might be divided into two: one for the "best" specification, and one, the larger of the two, for the "best" aeroplane built to the selected specification. From what we can gather the draft specification does not show obvious signs of having been discussed with people who have practical experience of inland transport.

One cannot help feeling that, if the draft specification has been correctly interpreted by those who have seen it, it falls between two stools by calling for a machine which is too large for internal and European work and not large enough for Empire air routes. If the new large flying boats on order for Imperial Airways are to be taken as an indication of the type of aircraft which that company considers suitable for the Empire routes, the type which would be created by this new specification must be a good deal too small, apart from probably being unsuitable in other directions.

From the technical aspect there are obvious difficulties in meeting the specification. This is in no way a serious criticism, as one would not expect the Air Ministry to expend the taxpayer's money on anything which was too easy. It is very right and proper that the specification should "aim high," and that those who decide to enter the competition should be compelled to incorporate in the design every refinement which modern knowledge can suggest, such as slots, flaps, retractable undercarriages, variable-pitch airscrew, and so forth. And on first examination the draft specification does not sound unduly difficult.

A range of 800 miles, carrying a payload of 4,000 lb., cruising at about 180 m.p.h. is not, in modern times, an unattainable combination. The famous Douglas D.C.2 almost achieves it. When carrying fourteen passengers and 2,160 lb. of fuel it has a total payload of 3,400 lb., with a range of 865 miles. The ratio of gross to tare weight of the Douglas is 18,000 : 11,875 = 1.515, which is by no means an exceptionally good figure, the average of a large number of types being about 1.65. British designers should be able to achieve this ratio for the competition machine. The Douglas carries fourteen passengers, which is two more than the minimum specified, but it carries a crew of but two as against the crew of three demanded of the British machine. There is thus in hand for the Douglas the equivalent of one passenger, or 200 lb., so that the payload falls short of the minimum stipulated by but 400 lb.

The Engine Problem

The standard power plant of the Douglas is two Wright "Cyclone" radial air-cooled engines rated at about 710 b.h.p. at 1,900 r.p.m. and 7,000 ft. altitude. At present there is not available to British designers a very wide choice of engines of this power suitable for commercial aviation. This is on the assumption that but two engines are installed. Apparently the draft specification contains a clause prohibiting the use of three engines. It is not very obvious why this clause should be inserted. It would seem that those who drew up the specification were guided by a desire to avoid placing the engine in the nose of the fuselage, presumably in order to keep down the level of noise in the cabin. It might be suggested that a third engine *has* been known to be fitted elsewhere than in the nose, and it does appear that by ruling out the third engine a number of suitable British engines are debarred from being used.

If one thinks in terms of a four-engined machine the position is little better. A total engine power of 1,500-1,600 b.h.p. will probably be required, and most of the British engine types available either fall rather short of the 400 h.p. or exceed it by too large a margin.

The choice of a machine in the 18,000-20,000 lb. class has, apart from its somewhat problematic utility for inland and European air routes, the drawback that it is sufficiently large to be rather expensive to build, and the number of firms which can afford, as a pure speculation, to put down something like £50,000 or £60,000 for such a machine is not likely to be large. This must, unfortunately, mean that instead of getting a large number of brains to concentrate on the problem, we shall get but relatively few.

The True Ideal

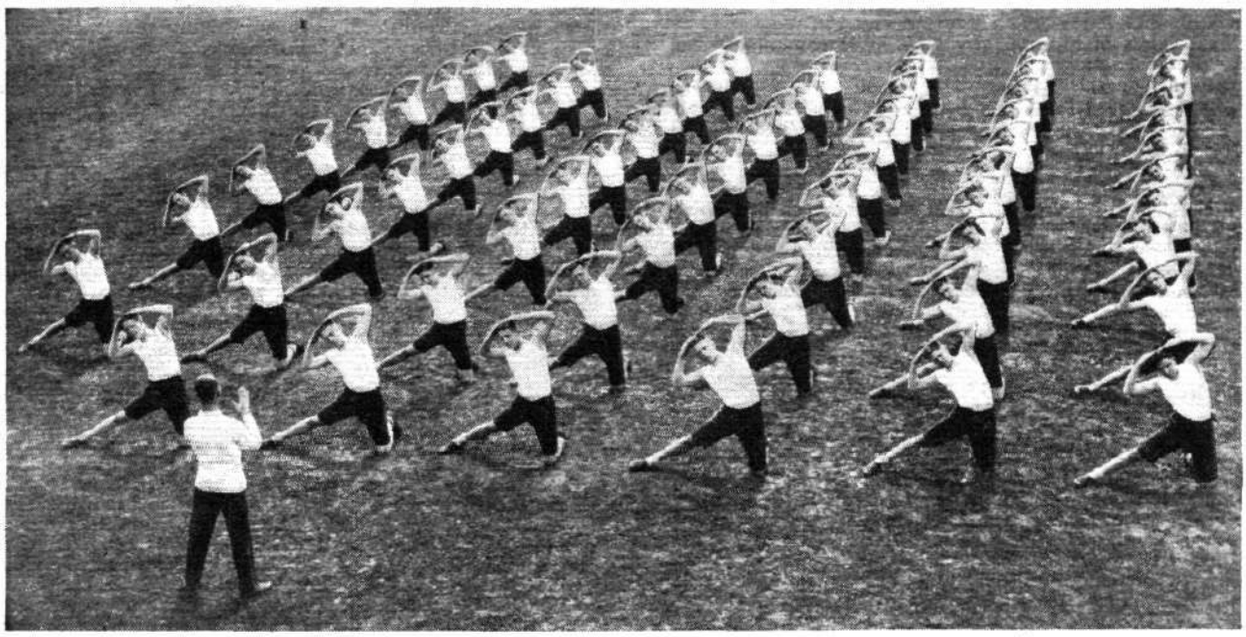
We cannot help feeling that if we have properly understood the main points of the specification, as discussed everywhere in aviation circles, the specification rather "misses the boat." To us it seems that something a little less ambitious, probably a good deal faster, and giving a really wide choice of engine combinations, would be more likely to find favour with a much greater number of operators. For example, a smaller machine, with about 500 miles range and cruising at 200 m.p.h., would be able to make the double journey between London and Scotland twice in a day—in the summer at any rate—and to many of the provincial centres three double journeys a day or even four, could be made. In view of Capt. de Havilland's recent assertion that ton-miles per gallon operational economy does not depend very much on cruising speed, 200 m.p.h. should not be too high to aim, and a machine with this speed should, on quite a number of routes, be capable of such intensive operation that its use would be attractive to operators and the public alike.

The Soviet Season

On May 5 the summer services open on Soviet air lines. A non-stop service between Moscow and Sverdlovsk, a passenger line from Moscow to Kharkov and a mail service between Moscow and Leningrad will be opened or re-opened. A direct service will also be operated between Moscow and Tashkent. The U.S.S.R. planners expect to carry 100,000 passengers this year as against 70,000 in 1934.

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS *AIR MINISTRY ANNOUNCEMENTS*



FINE PHYSIQUE : Airmen at Uxbridge practising for their display at the Royal Tournament at Olympia, which will be held from May 9 to 25.

PERMANENT COMMISSIONS FOR SHORT SERVICE OFFICERS (MEDICAL BRANCH)

The Air Council have decided to adopt the following procedure in connection with the appointment of short service officers of the medical branch to permanent commissions. The grant of such commissions will be by selection, an average of six vacancies being offered each year. Selections will be made twice yearly, in May and November, and the normal zone for consideration will be during an officer's second year of service. In this way the qualifications of each officer will be balanced against those of his contemporaries so as to secure a strictly equitable consideration of the merits of all the competitors. To be eligible for consideration, officers must be fit for full duty at home and abroad, and must, on April 1 or October 1 prior to the date on which the recommendations are due, have completed not less than one or more than two years' service. After consultation with their principal medical officers, A.O's.C. will furnish to the Air Ministry by May 15 and November 15 each year a report on *all* eligible medical officers holding short service commissions, stating in each case whether or not the officers are recommended as suitable for selection. Appointments to permanent commissions will be effected as from the date of expiry of the active list periods of the officers' short service commissions.

SILVER JUBILEE HOLIDAY

It has been decided that Monday, May 6, 1935, shall be observed as an additional public holiday. Civilians employed under the Air Ministry are therefore to be given a paid holiday on that day, and any who are required, owing to the exigencies of the service, to work on that day, should be granted a day off in lieu subsequently. Normally, civilians casually employed are not allowed pay for a public holiday unless they have completed six months' continuous service at the date of the holiday. It has been decided that that requirement shall be waived in connection with the Silver Jubilee Holiday.

OLD SARUM—PAY ACCOUNTING

As from April 1, 1935, the pay accounting work in connection with the School of Army Co-operation, Old Sarum, No. 13 (Army Co-operation) Squadron, No. 16 (Army Co-operation) Squadron and the R.A.F. Balloon Centre, Rollestone Camp, has been centralised in one cash account under the title "R.A.F. Station, Old Sarum."

CADRE AND A.A.F. SQUADRONS

Cadre and Auxiliary Air Force squadrons will carry out annual training during 1935 as follows :—

Cadre Squadrons.

Unit.	Period.	Place.
No. 500 (County of Kent) (B) Squadron.	12th to 25th May.	Tangmere.
,, 501 (City of Bristol) (B) Squadron.	4th to 17th Aug.	Manston.
,, 502 (Ulster) (B) Squadron	14th to 27th July.	Manston.
,, 503 (County of Lincoln) (B) Squadron.	14th to 27th July.	Hawkinge.
,, 504 (County of Nottingham) (B) Squadron.	4th to 17th Aug.	Hawkinge.

Auxiliary Air Force Squadrons.

No. 600 (City of London) (F) Squadron.	15th to 27th July.	Sutton Bridge.
,, 601 (County of London) (F) Squadron.	20th July to 3rd Aug.	Lympne.
,, 602 (City of Glasgow) (B) Squadron.	15th to 27th July.	North Coates Fitties.
,, 603 (City of Edinburgh) (B) Squadron.	21st July to 4th Aug.	Tangmere.
,, 604 (County of Middlesex) (F) Squadron.	3rd to 17th Aug.	Tangmere.
,, 605 (County of Warwick) (B) Squadron.	4th to 18th Aug.	Manston.
,, 607 (County of Durham) (B) Squadron.	20th July to 3rd Aug.	Manston.
,, 608 (N. Riding) (B) Squadron.	10th to 24th Aug.	Manston.

THE R.A.F. BENEVOLENT FUND

The usual meeting of the Grants Committee was held at Iddesleigh House on Tuesday, April 16. Mr. W. S. Field was in the chair, and the other members of the committee present were Mrs. L. M. K. Pratt Barlow, O.B.E., and Wing Cdr. H. P. Lale, D.S.O., D.F.C. The committee made grants to the amount of £248 10s. 6d. The next meeting was fixed for May 9.

INDIAN AND EASTERN GARDEN PARTY

The eleventh annual Indian Empire and Eastern Garden Party for officers (including members of the nursing services) and civilians who have been in India, the Crown Colonies, Sudan, Palestine, Abyssinia, Afghanistan, Arabia, China, Egypt, Iraq, Japan, Nepal, Persia, Sarawak, or Siam, and their wives and daughters, will be held at the Hurlingham Club, Fulham, on Monday, July 1, 1935, from 2 p.m. to 6.30 p.m. Widows of such officers or civilians are also eligible. Tickets, 7s. 6d. each (including tea and light refreshment), can be obtained from Lt.-Col. C. C. Anderson, 10, Gilston Road, S.W.10. Remittances must accompany all applications for tickets. The proceeds will be given to Lady Minto's Indian Nursing Association.

R.A.F. SIGNALS

In Army Orders issued on April 15 it was announced that the King has approved a reorganisation of various Supplementary Reserve units of the Royal Corps of Signals. Twenty-two signal sections are disbanded, and five units of Royal Air Force signals, with three construction sections, are formed.

The Royal Corps of Signals provides ground communications for Royal Air Force contingents with the Army in the field in war. Their duties include the building of telegraph and telephone routes and the operation of telegraph and telephone instruments and exchanges. Royal Air Force wireless communications are manned by Royal Air Force personnel.

AIR FORCE LIST

The April issue of the *Air Force List* has now been published. It can be purchased (price 2s. 6d.) from H.M. Stationery Office at the following addresses: Adastral House, Kingsway, London, W.C.2; 120, George Street, Edinburgh; 2, York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square, Belfast.

VACANCIES FOR CIVILIAN ACCOUNTANT OFFICERS

A number of vacancies for civilian accountant officers will arise in the course of the year, and others will arise in subsequent years. The appointments are non-pensionable on the scale £277, rising by five annual increments to £337 per annum; this scale is at present subject to a temporary reduction of approximately £3. In addition, if vacancies occur overseas, an appropriate foreign service allowance will be payable.

Applications are invited from officers on the retired list who have had service as accountant officers in the Royal Air Force and who are fully familiar with the present accounting procedure.

R.A.F. officers at present serving are invited to apply for these posts not more than six months prior to the date of retirement.

SICK LEAVE FOR EMPLOYEES

It has been decided that, for an experimental period of one year, officers commanding shall have discretion to waive, in suitable cases, the requirement of a medical certificate for a *single day's* sick absence in the case of employees eligible for sick pay under Part III of the Memorandum of Sick Leave Regulations applicable to temporary and unestablished employees, provided that the number of days for which sick pay is given without medical certificate in no case exceeds seven in any period of twelve months.

TRADE TESTS FOR MEDICAL AND DENTAL BRANCHES

The trade tests for the medical and dental branches which are due to commence on the first Monday in May, 1935, will, in consequence of that day having been set aside as a public holiday, commence instead on Tuesday, May 7.

ROYAL AIR FORCE GAZETTE

London Gazette, April 16, 1935

General Duties Branch

The following Flying Officers are promoted to the rank of Flight Lieutenant (March 27):—T. B. Cooper, H. Ford, W. R. Sadler.

The following Pilot Officers are promoted to the rank of Flying Officer:—F. D. Terdrey (Jan. 8); H. S. Darley (March 12); D. E. Turner, P. S. Foss (March 23).

The following Flying Officers are transferred to the Reserve (April 11):—CLASS A.—G. V. Barber, A. E. Dobell, G. F. K. Donaldson, L. J. M. White. CLASS C.—D. W. Morrish.

Stores Branch

P.O. on probation P. G. Bullen is confirmed in rank and promoted to the rank of Flying Officer (March 20).

Memorandum

F/O. F. Lodge is removed from the retired list (March 21).

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers
General Duties Branch

M. H. Fitzgerald (Lt., East Yorkshire Regt., R.A.R.O.), is granted a commission as Flying Officer on probation in class A (April 5).

The following Pilot Officers are promoted to the rank of Flying Officer:—D. L. Rawnsley (Jan. 21); H. Arnold, R. A. Atkinson, A. N. Bardolph, R. G. T. Cooke, R. B. Crow, A. T. Irvine, C. E. Madge, R. T. S. Norwood, K. G. Seth-Smith, P. E. A. Talbot, L. Mount-S. Whetham (Feb. 14); J. D. Kirwan (Feb. 16).

The following Flying Officers are transferred from class A to class C:—C. G. Davies (Oct. 21, 1934); D. B. Knapp (March 30).

P/O. S. W. Fitt is transferred from class AA (ii) to class C (March 16); F/O. R. A. Barnett relinquishes his commission on completion of service (March 13).

AUXILIARY AIR FORCE

General Duties Branch

No. 603 (CITY OF EDINBURGH) (BOMBER) SQUADRON.—P/O. G. L. Denholm is promoted to the rank of Flying Officer (Dec. 27, 1934).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Group Captains.—W. V Strugnell, M.C., to Reception Depot, West Drayton, 3.4.35; to command vice Wing Cdr. E. L. Tomkinson, D.S.O., A.F.C. M. Henderson, D.S.O., to Aircraft Depot, India, Karachi, 9.3.35; to command vice Wing Cdr. A. T. Whitelock. G. B. Dacre, D.S.O., to Special Duty List, 21.3.35; on appointment as Air Attaché, Rome, vice Group Capt. T. G. Hetherington, C.B.E.

Wing Commanders.—F. Fernihough, M.C., to No. 1 Air Defence Group Headquarters, 2.4.35; for Air Staff duties vice Sqn. Ldr. F. Beaumont. C. R. Cox, A.F.C., to R.A.F. Station, Calshot, pending commencement of Flying Boat Pilots' Course, 8.4.35. F. W. Trott, O.B.E., M.C., to Air Ministry (D. of P.), vice Wing Cdr. C. R. Cox, A.F.C., 8.4.35.

Squadron Leaders.—H. S. P Walmsley, M.C., D.F.C., to No. 8 (B) Squadron, Aden, 9.3.35; to command vice Sqn. Ldr. H. B. Russell, D.F.C., A.F.C. E. P. M. Davis, A.F.C., A.M., to Dept. of Chief of the Air Staff, Air Ministry, 1.4.35, vice Flt. Lt. H. N. Thornton. H. T. Lydford, A.F.C., to No. 6 Flying Training School, Netheravon; for Chief Flying Instructor duties, 7.4.35.

Flight Lieutenants.—D. D. M. Eastwood, to No. 6 Flying Training School, Netheravon, 4.4.35. R. Menzies, to No. 99 (B) Squadron, Mildenhall, 2.4.35. D. W. R. Ryley, to No. 57 (B) Squadron, Upper Heyford, 2.4.35. H. I. Cozens, to Headquarters, R.A.F., Iraq, Hinaidi, 25.2.35. D. J. Eayrs, to Armament Training Camp, Leuchars, 1.4.35.

Flying Officers.—W. E. Coope, to No. 1 Air Defence Group Headquarters, 4.4.35. G. R. A. Elsmie, to Central Flying School, Wittering, 30.3.35. D. Y. Feeny, to Aircraft Depot, Iraq, Hinaidi, 18.3.35. H. G. Lee, to Armament Training Camp, Leuchars, 1.4.35. A. C. Martin, to Armament Training Camp, Leuchars, 1.4.35. R. G. S. Morgan-Smith, to Headquarters, Inland Area, Stanmore, 3.4.35.

Acting Pilot Officers.—The following Acting Pilot Officers are Posted to No. 5 Flying Training School, Sealand, on 30.3.35, for flying training.—M. S. Bocquet, N. A. N. Bray, J. G. Brown, G. A. Corder, L. E. Cryer, C. S. Darwood, T. M. Evans, A. D. C. Fair, H. C. Farman, T. W. C. Fazan, D. J. Henderson, R. R. Holder, P. I. Hoyle, C. G. Isacke, J. A. Kent, G. F. Lerwill, F. E. Mack, O. R. C. Moseley, D. Nolan-Neylan, J. A. O'Neill, J. W. H. Radice, H. R. Rittey, J. B. Russell, C. F. Scott, A. M. Smith, E. A. Sprange, E. H. T. Thwaites, A. J. Trumble, J. Vivian, R. Williams.

Stores Branch

Wing Commander.—W. E. Aylwin, O.B.E., to Headquarters, R.A.F., Iraq, Hinaidi, 30.3.35; for Equipment (Stores) Staff duties vice Wing Cdr. G. A. Hilliar.

Medical Branch

Group Captain.—H. A. Hewat, to Headquarters, R.A.F., Halton, 8.4.35; for duty as Principal Medical Officer vice Group Capt. F. C. Cowtan.

Squadron Leader.—V. R. Smith, to Headquarters, Inland Area, Stanmore, 5.4.35; for duty as Deputy Principal Medical Officer.

Flight Lieutenants.—H. Penman, to No. 1 Flying Training School, Leuchars, 1.4.35; F. I. G. Tweedie, to No. 1 Flying Training School, Leuchars, 1.4.35.

Flying Officers.—C. A. Lewis, to No. 2 Flying Training School, Digby, 8.4.35; W. G. S. Roberts, to No. 6 Flying Training School, Netheravon, 8.4.35. A. W. Smith, to No. 3 Flying Training School, Grantham, 8.4.35. G. H Stuart, to Central Flying School, Wittering, 8.4.35. J. S. Wilson, to No. 5 Flying Training School, Sealand, 8.4.35.

Chaplains Branch

Rev. A. R. A. Watson, M.A., to No. 5 Flying Training School, Sealand, 5.4.35.

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THE AUTOMATIC PILOT: AILERON CONTROL

Manner of Application of the Gyro-vertical Mechanism, and General Conclusions

By G. R. M. GARRATT, M.A. (CANTAB.)

(*Continued from page 18, March 28*)

HAVING shown how the gyroscope does, in fact, define the vertical both during straight and curvilinear flight, it remains to describe the manner in which the gyro-vertical mechanism is adapted to the control of the ailerons.

Since the outer gimbal ring is stabilised by the gyroscope in the vertical plane, it will be clear that when the aircraft rolls or banks, relative motion must occur between the outer gimbal ring and the aircraft about the pivots of the outer ring. This relative motion is used to operate a valve which controls the movements of the ailerons.

Referring to Fig. 3, on the next page, a small valve may be seen at F. This valve contains a piston which is connected by a link to the outer gimbal ring of the gyroscope, and it will be clear that when relative motion occurs about the pivots of the outer gimbal ring as the result of the aircraft rolling or banking, then the piston of valve F will move relatively to the valve body.

The valve F is actually only a relay valve which serves to magnify the small movements of its piston to the piston of the main aileron valve shown at G. The construction of the relay valve is identical with that described in a previous article (*The Aircraft Engineer*, August 30, 1934), and it need only be remarked here that relative motion between the relay valve piston and the valve casing is identically relayed (with slight magnification) to the piston of the main aileron valve. It will therefore be clear that when the relay valve is operated, due to the banking of the aircraft, the main aileron valve G is brought into operation, and compressed air is thereby admitted to one side or the other of the aileron servo-motor H through the flexible pipes shown in the illustration.

The servo-motor H contains a double-acting piston which is connected by the piston rod to the lever J, the top of which is carried in a substantial bearing on the main framework. The ailerons are connected by means of the usual cables to the lower end of the lever J, and it is through this lever that the motion of the servo-motor piston is conveyed to the ailerons.

Considering the sequence of events which occurs when the aircraft rolls, it will be seen that the relative motion between the outer gimbal ring and the aircraft displaces the piston of the relay valve, and hence displaces the piston of the main aileron valve G. This causes the admission of compressed air to the appropriate side of the servo-motor H, the piston of which imparts a movement to the ailerons through the lever J and the connecting cables in such a direction as to counteract the initial disturbance and to restore the aircraft to "an even keel."

It will be apparent, however, that unless suitable provision is made to limit the travel of the servo-motor piston, full aileron angle would be applied for even a small displacement of the aircraft from the level position. In order to obtain the desirable condition that the application of aileron angle shall be proportional to the displacement of the aircraft from the laterally level position, a "follow-up" mechanism is incorporated, the operation of which will be clear from the following description.

The relay valve F and the main aileron valve are not carried on a rigid part of the main framework as might be supposed from an inspection of the photographs, but are carried on a member known as the "follow-up frame," which is pivoted about the same longitudinal axis as the outer gimbal ring of the gyroscope. The follow-up frame is connected by a pair of adjustable levers K, Fig. 3, to the top of the aileron lever J in such a manner that a movement of the piston of the aileron servo-motor H causes an angular movement of the follow-up frame about its pivots.

Considering the operation of this arrangement, a disturbance of the aircraft from the laterally level attitude causes a relative movement between the piston and **body**

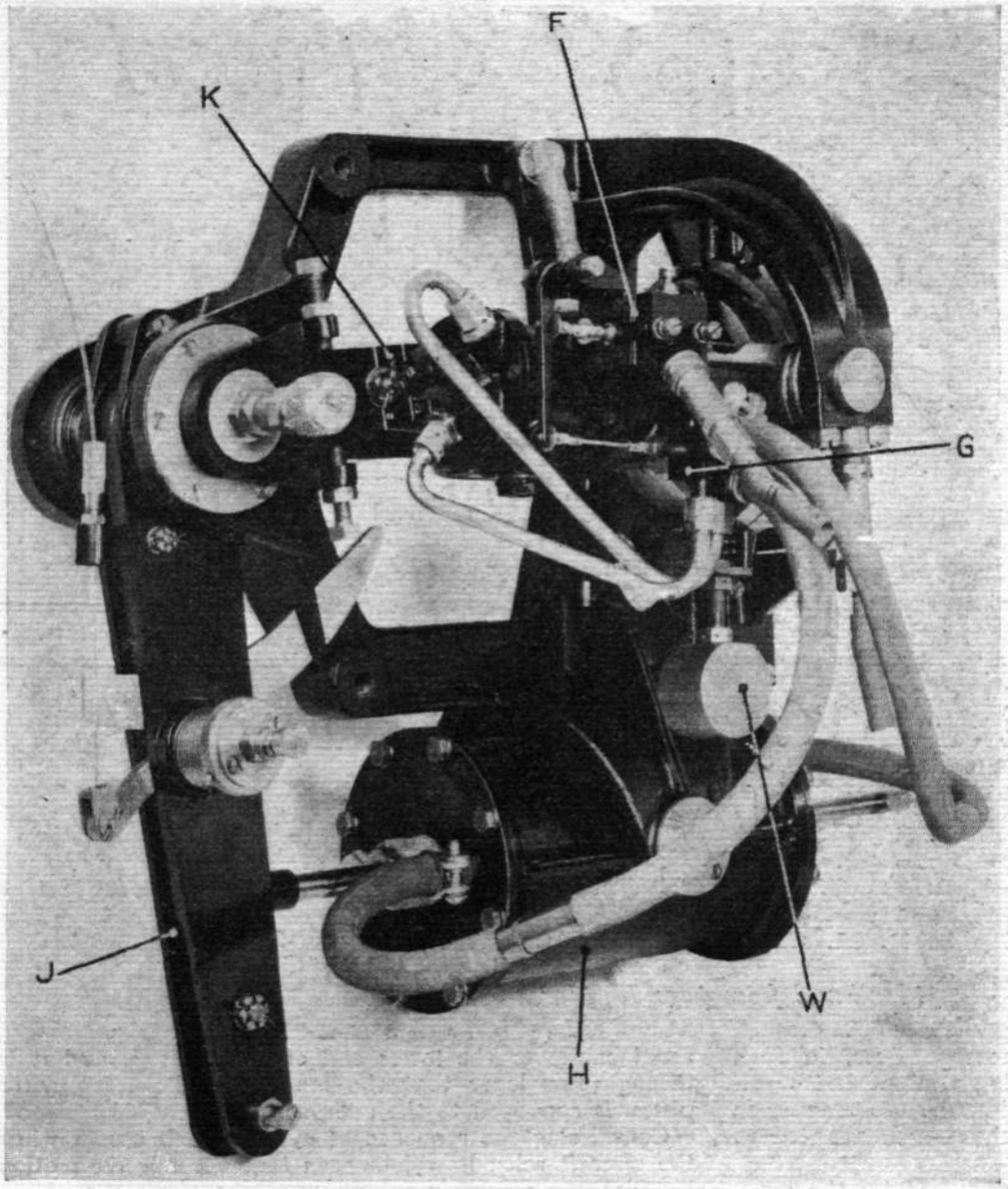


Fig. 3. The aileron unit, showing operating valves and aileron servo-motor. An explanation of the reference letters appears in the text.

of the relay valve, as has already been described. This relative movement operates the main aileron valve and so causes the application of aileron angle by the movement of the servo-motor piston. As the servo-motor applies aileron angle, however, it simultaneously brings about a small rotary movement of the follow-up frame about the longitudinal axis of the outer gimbal ring in such a direction as to result in the reclosing of the relay valve, and when the relay valve is closed no further movement of the servo-motor piston, and hence no further application of aileron angle, can occur. It will thus be seen that the application of aileron angle is limited to an amount determined by the relative displacement of the aircraft with respect to the outer gimbal ring of the gyroscope. That is to say, the application of aileron angle is proportional to the actual angular displacement of the aircraft from the laterally level attitude.

It will be appreciated that different aircraft require varying degrees of aileron movement for the correction of any given disturbance, and in order that the optimum adjustment may easily be obtained, provision is made for the adjustment of the relative lengths of the levers K. Adjustment of the lengths of these levers alters the effective gearing ratio connecting the movement of the servo-motor piston with the movement of the follow-up frame, and hence alters the degree of aileron angle which is applied for any given disturbance of the aircraft. As the aircraft responds to the control of the ailerons and returns to the level attitude so the aileron angle is progressively reduced, and, in actual fact, the aircraft returns to the level position by a highly damped or almost aperiodic oscillation.

The only part of the control which has not been described is the centraliser unit, which serves to locate the gyroscope during the period when the control is not in use, or while the gyroscope is being run up to speed. This unit, however, is identical with that fitted to the rudder and elevator control, and will not, therefore, be described again.

It remains to remark that the entire operation of the aileron mechanism is under the control of the pilot by means of the same "main control cock" which serves the rudder and elevator unit.

The two units together form a three-axes automatic pilot capable of controlling any aircraft, from the smallest to the largest, with the highest precision. The directional control will maintain the machine on a predetermined course within 3 deg. to 5 deg. per hour, and the pitch and roll attitudes are accurately stabilised within ¼ deg. Throughout the development of the automatic pilot the foremost aim has been the production of a control of the highest possible precision. Experience in the Royal Air Force over a period of five years has shown that reliability goes hand in hand with simplicity of design and operation, and it may be confidently expected that within a comparatively short period no commercial or freight-carrying aircraft will remain unequipped with automatic control.

A "Symposium on Welding"

Considerable aeronautical interest promises to attach to the so-called "Symposium on the Welding of Iron and Steel," to be held under the auspices of the Iron and Steel Institute in the Lecture Theatre of the Institution of Civil Engineers on May 2 and 3. The societies co-operating include the Royal Aeronautical Society, and papers have been promised by the Fokker Company of Holland; by Mr. R. F. Taylor, of A. V. Roe and Co., Ltd.; by Mr. J. B. Johnson, M.E., of the War Department Air Corps, Dayton, Ohio, U.S.A.; and by Mr. H. Sutton, of the Royal Aircraft Establishment, Farnborough.

The Dutch aircraft firm, N. V. Nederlandsche Vliegtuigenfabriek (Fokker) have longer experience of welding than any other aircraft constructor in the world. While A. V. Roe and Co. began welded construction by building certain Fokker types under licence, this firm has since developed methods of its own, differing from the original Fokker methods. America took up welding fairly early, and has applied it to high-grade steels.

AUTOMATIC ENGINE CONTROLS

The Hobson System : A "Robot" Scheme Which Relieves the Pilot of All Care for the Welfare of His Engine During Flight

By ERNEST W. KNOTT, M.I.A.E., M.S.A.E.

THE introduction of the supercharged or "blown" aircraft engine brought with it an improvement in performance undreamed of during the early days of flying, but it also brought with it many additional complications that have added to the already numerous collection of cockpit instruments as well as to the responsibilities of the pilot to whose care it is entrusted, and to relieve the pilot of these responsibilities and distractions is the purpose of the automatic devices to be described.

Each year engine manufacturers bring out new models giving a greater power output per litre of engine capacity, due solely to continuous experimental work backed by the efforts of research workers and metallurgists, with all the time the salutary menace of international competition hovering in the background.

Each succeeding year sees the supercharged or normally aspirated but extra high compression engine become more highly stressed, more temperamental in its need for careful handling, and with a discrimination for special fuels which classes it as something of an epicure

The "blower was the logical answer to the falling-off in power of an engine as it gained height, the cause being the increasing lack of oxygen as these heights are reached. Normal ground power was sustained to several thousand feet (the ultimate height to which the blower would sustain normal ground atmospheric pressure being known as the engine's "rated height"), but it introduced certain disadvantages.

If the throttle was fully opened, at or near the ground, compression and explosion pressures passed the limit of safety, and severe detonation took place with destructive results. Hence it was customary to limit the opening of the pilot's throttle lever by means of a series of stops or gates, each stop corresponding to a given altitude, and the pilot was relied upon conscientiously to observe these limitations. Human nature, being much the same the world over, inevitably led to abuse of this arrangement, and during the last three years or so all supercharged engines in Great Britain have been fitted with an automatic device which limits the induction pipe pressure to a predetermined safe amount even if the pilot opens his throttle lever further than desirable.

In America and on the Continent such safety devices are, with a few exceptions, practically unknown, and authentic instances have been cited where reasonable periods between overhauls have been reduced to one quarter of that guaranteed or anticipated, solely due to the pilots, whose ideas on maximum permissible pressure were as exuberant as their "Joie de Vivre," whilst appropriate mixture strengths and cylinder temperatures received scant consideration.

Fig. 1 shows diagrammatically the application of a boost control to a supercharged engine, whilst Fig. 2 shows the basic construction of the Hobson boost control. It consists of an airtight chamber connected to the pressure side of the blower, and containing a bellows of the barometric type. One end of the bellows is fixed to the chamber by an adjustable screw and lock-nut, and the other to a sliding valve.

Variations in boost pressure causes the bellows to expand or contract, the resulting movement of the valve permitting engine oil pressure to be admitted to either one side or the other of a piston, which is the servo device developing sufficient power to control the carburetter throttle opening through appropriate linkage. By altering the position of the bellows in its chamber, by means of the adjustable screw, the maximum desirable boost pressure can be set at ground level, and as the machine climbs to its rated height, the influence of reduced atmospheric pressure on the bellows received *via* the blower gradually opens the carburetter throttle until at rated height the throttle is wide open, the induction pipe pressure being kept at a constant figure during this period.

This was the first real step towards safeguarding the engine.

It was found that by giving the engine a mixture strength about 12 per cent. richer than normally necessary for full power at safe temperatures, excess power up to 17 per cent. could be safely taken from it for reasonable periods. The advantage of this extra power—in some instances 80 to 100 h.p.—for taking off, as well as in emergencies, was immediately grasped, and carburetters were equipped with an extra enrichment jet for this purpose, which could be put into action at the same time as a

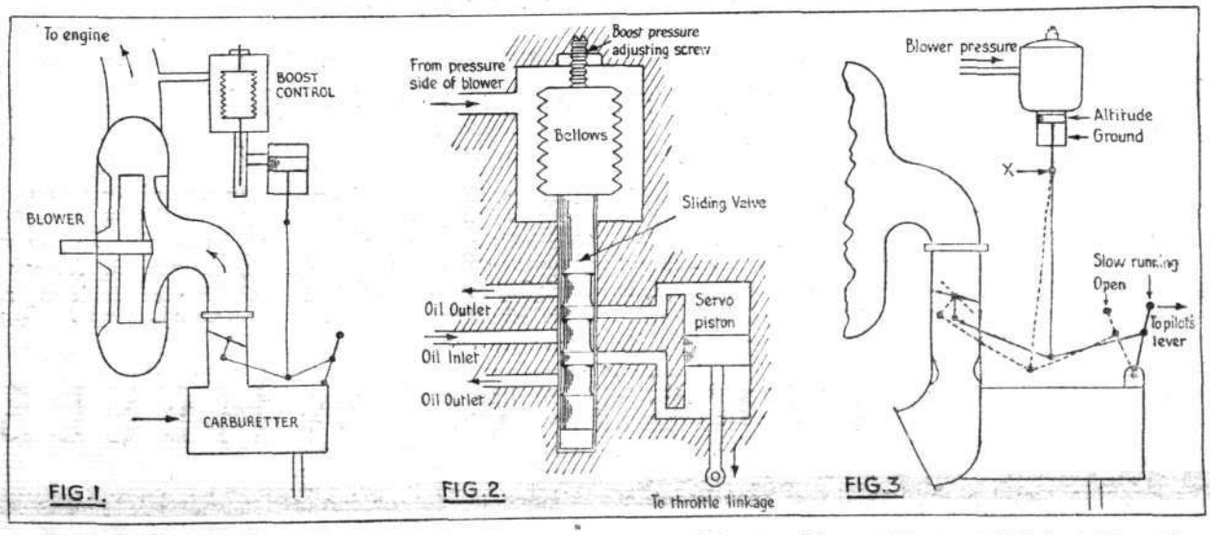


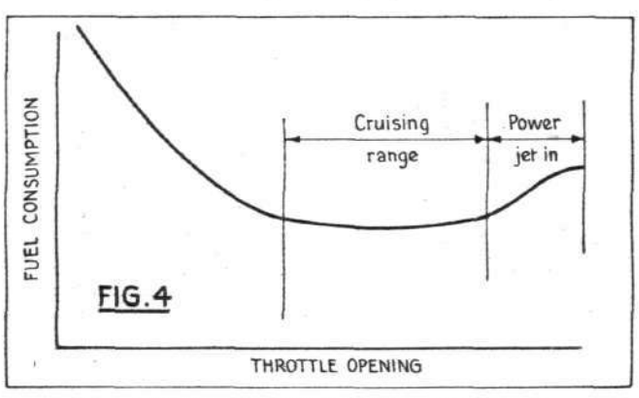
Fig. 1. Diagrammatic Layout of Blower, Boost Control and Carburetter linkage. Fig. 2. Diagram of Hobson Boost Control Fig. 3. Boost Control linkage.

device known as the " boost over-ride." The latter consists of forcing the boost control to give a throttle opening in excess of that which it normally controls; in fact, to an extent permitting up to 17 per cent. increase in power.

This over-ride can be obtained in two ways. In one method a lever shifts the bellows bodily in its chamber an amount to be determined by experiment when the enrichment jet comes into action, whilst the other consists of allowing some of the pressure in the bellows chamber to leak away or be spilled. The former method is called a mechanical over-ride, and the latter an air leak over-ride, but either method may only be used if an auxiliary enrichment jet or other enrichment means, specifically employed for the purpose, is used.

Fig. 3 shows one type of linkage in the form of a toggle mechanism, and the carburetter throttle is shown in the slow-running position. Induction pipe pressure will be low, and the servo piston will take up its " altitude " position. Assuming that the pilot wishes to take off, he first puts his combined boost over-ride and enrichment lever to the " take-off boost " position, also giving rich mixture, and then moves his throttle lever to the full open position, carrying the carburetter throttle with it, and the engine speed goes up, accompanied by an increase in boost pressure. This pressure causes the bellows to contract, the piston valve permits oil to pass to the top side of the piston, which falls, and by altering the length of the links closes the throttle to the required safe opening.

During the climb to rated height, the piston gradually rises, opening the throttle progressively, but always keeping the same boost pressure as at ground level, the dotted lines in Fig. 3 showing some position between ground level and rated height. Above rated height, of course, the boost control can do no more except to limit the induction pipe pressure if the machine is power-dived or flown in such a manner that excessive engine revolutions are possible and



Throttle curve, showing action of power jet.

above rated height, the carburetter throttle responds to the pilot's lever as in a normally aspirated engine, the linkage pivoting about the point X.

It is interesting to see what happens if the pilot gradually moves his throttle lever towards the " closed " position. Each movement of the lever will close the throttle a certain amount, but the closing will cause a drop in boost pressure, which will cause the boost control bellows to expand somewhat, and the piston will move until the throttle is again opened to a position giving normal boost.

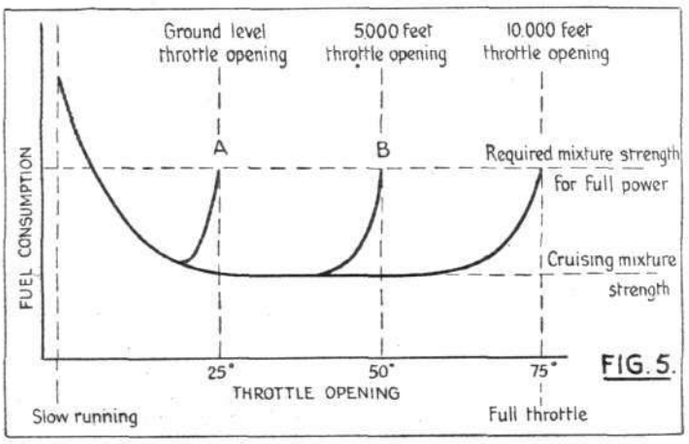
This will go on until the piston reaches the end of its stroke, after which the throttle will be closed by direct mechanical movement of the pilot's lever. There is, therefore, a dead period during which the pilot's lever has lost motion. If, for example, at or near the ground a throttle opening of 25° out of a total movement of 75° gives normal boost, this opening can be obtained by a movement of 25° on the part of the pilot's lever, and any additional movement through the remaining 50° gives no further throttle opening at ground level.

All modern carburetters are equipped with some sort of device for varying the mixture strength as between cruising and full power conditions, and it is customary practice to control the time of commencement of operation of this device—which in this article is called the " power jet "—by mechanically connecting it and the carburetter throttle, so that at a certain angular throttle opening the mixture strength was increased.

A typical good throttle curve of this type is shown in Fig. 4.

With normally aspirated engines this procedure is quite satisfactory, but on blown engines, fitted with the conventional type of boost control, it is possible under certain conditions to obtain full power on a cruising mixture strength; a highly damaging procedure.

This is due to the lost motion between the pilot's lever and the throttle. To take a concrete example, assume, as



Required throttle curves at different heights and throttle openings, showing necessity of traversing the power jet.

in the aforementioned instance, that at or near ground level normal boost is obtained with 25° throttle opening, and that for best fuel consumption at cruising speeds the enrichment for full power occurs at a carburetter throttle opening of 50°.

It is obvious that if the pilot leaves his cockpit lever anywhere between 25° and 50°, he is obtaining power conditions with cruising mixture strengths, due to the fact that the power jet is not yet in operation. It was, therefore, incumbent on the pilot to see that below rated height his cockpit lever was always in a position to ensure that the mixture strength was rich enough for full power, and in some instances lack of observation of this extremely important detail caused engines to be damaged through overheating, in the same way that excessive use of the altitude control valve can do.

Fig. 5 shows how any fixed position of the power jet is useless with varying altitudes. If the time of opening is fixed at " A," the power jet will be in action during cruising speeds, at 3,000 feet and above, and if in action at " B," full power with weak mixture can be obtained below 5,000 feet.

Some means, therefore, was desirable to ensure that at whatever the altitude between ground level and rated height, the pilot could use his cockpit lever as though the engine was normally aspirated, *i.e.*, he should always be able to move his lever back from full throttle to a cruising position where fuel economy was ensured, and on returning to full power conditions, be sure of having the correct richer mixture. Due to the action of the boost control, this will obviously vary with different altitudes, and it is therefore desirable to alter the time at which the power jet comes into action, it being necessary to have it in action at small throttle openings at or near the ground, its entrance becoming progressively later as the engine approaches rated height.

A short time ago an invention was patented which, whilst primarily intended to counteract the faults enumerated above, incidentally brought with it several added advantages. Its action can best be explained as follows:—

Assume that the boost control has been adjusted so that the desired induction pipe pressure is obtained at full throttle under ground level conditions, and that as the pilot's lever was slowly moved towards the closed (slow-running) position, the pressure-adjusting screw at the end of the boost control chamber was slowly unscrewed, so that the boost pressure was progressively and evenly lowered. Having reached the closed position, assume that the reverse action takes place, and that the boost pressure is progressively raised as the pilot's lever is opened. Then substitute for the hand adjustment of the screw some mechanical device such as a cam, connected to the *pilot's cockpit lever.*

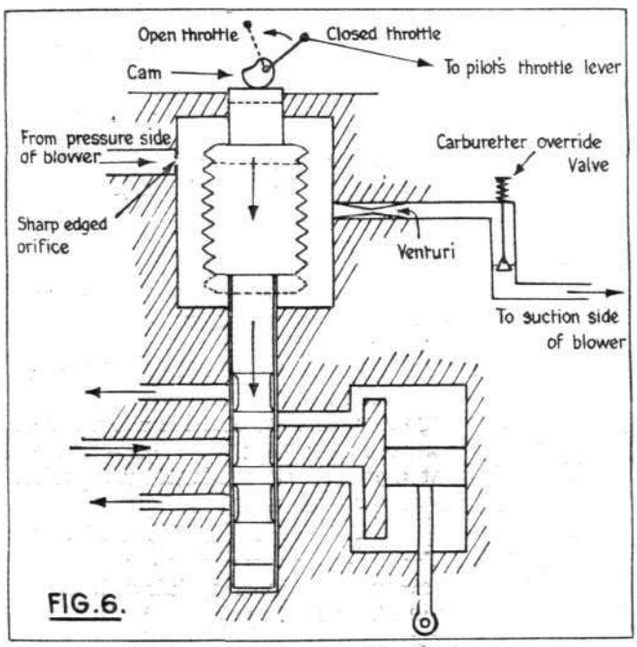


Diagram of Variable Datum Boost Control with Air Leak Over-ride.

Remove the conventional connecting means between the power jet valve and the carburetter throttle, and have it operated directly by the *pilot's lever,* also have the accelerating pump connected to this lever, and the following advantages are immediately obtained.

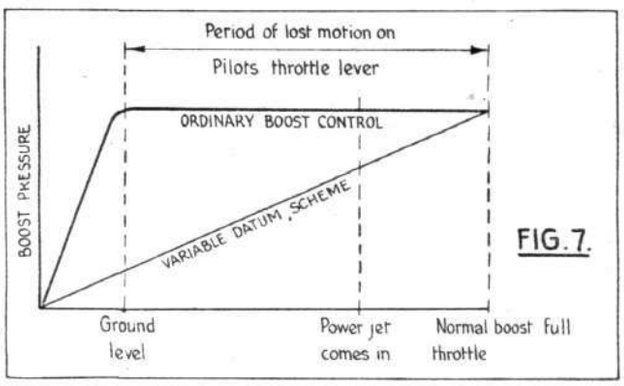
Each partial movement of the pilot's lever gives a definite alteration in boost pressure, and it is impossible below rated height to get normal (full) boost until the pilot's lever is in its "full-open" position.

As the time of opening of the power jet valve is now solely a function of the position of the pilot's lever, it is obviously impossible to obtain, as hitherto, full boost on anything except the correct mixture strength.

All lost motion between the pilot's lever and the carburetter throttle is eliminated, each and any position of his lever is a reliable indication of the boost pressure he is getting, and more exact control of engine revolutions is obtainable, a feature of great assistance during formation flying.

In addition—at any rate on single-engine machines—other adjuncts, which are partly or wholly influenced by boost pressure, can be controlled directly from the pilot's throttle lever, such as ignition timing and the supply of heat to the carburetter induction system.

Fig. 6 shows the layout of the Variable Datum Boost Control of the air-leak over-ride type. The inlet on the pressure side of the bellows chamber is fitted with a sharp-edged orifice, whilst the outlet side has a small venturi-shaped orifice which leads to the suction side of the blower, *via* the over-ride valve in the carburetter. By choosing suitable sizes for these orifices, the pressure in the bellows chamber can always be dropped a constant amount, and



Boost pressure curves, showing the difference between the ordinary Boost Control and the Variable Datum type.

remains at some pre-determined value as long as the valve is opened.

Fig. 7 shows the difference in boost pressure curves given by the ordinary type of boost control and the Variable Datum type.

It will be seen, therefore, that the Variable Datum Scheme gives the following advantages:—

(1) The engine is protected from excess induction pipe pressure under all conditions.

(2) Increased power for take-off without damaging the engine is available.

(3) The pilot's throttle lever has the same progressive control of engine power as with unsupercharged engines.

(4) Full power and cruising conditions can only be obtained with correct mixture strengths.

(5) On single-engined machines, the control of ignition timing and heat input is simplified, and more exactly in accordance with functional requirements than hitherto.

(To be concluded next month.)

Split Flaps and Ailerons

Technical Report No. 499 of the American N.A.C.A. covers the twelfth of a series of systematic tests being conducted by the National Advisory Committee for Aeronautics to compare different lateral control devices with particular reference to their effectiveness at high angles of attack. The present tests were made in the 7ft. × 10ft. wind tunnel with two sizes of upper-surface ailerons on rectangular Clark Y wing models equipped with full-span split flaps. The upper-surface ailerons were formed from the upper portions of the split trailing edges of the wings. The tests showed the effect of the upper-surface ailerons and of the split flaps on the general performance characteristics of the wings, and on the lateral controllability and stability characteristics. The results are compared with those for plain wings with ordinary ailerons of similar sizes.

With flaps neutral, the upper-surface ailerons with up-only movement gave rolling moments at angles of attack below the stall that were reasonably close to an assumed satisfactory value. The yawing moments (wind axes) were positive (favourable) with large aileron deflections, but, at all except the lowest angles of attack, they were slightly negative (adverse) with small deflections. The control forces were much greater than those of ordinary ailerons of similar sizes having conventional movement With the flaps deflected for maximum lift, the upper-surface ailerons gave control moments considerably below the value assumed to be satisfactory. The magnitudes of the positive (favourable) yawing moments were smaller than those with flaps neutral, and negative (adverse) ones occurred with small aileron deflections at all angles of attack. Above the stall, flaps neutral or deflected, both sizes of upper-surface ailerons indicated poor control

CONTINUOUS BEAMS

The Graphical Solution of the Most General Problems

By J. HANSON, B.Sc., D.I.C.*

Section 1.—Introduction

SOLUTIONS of the problem of the laterally loaded beam continuous over more than two supports are generally dependent on the Theorem of Three Moments, which is associated with the names of Clapeyron, Bertot and Bresse.

Solutions of the more complicated problem of the laterally loaded continuous beam with end load were apparently first given by H. Booth and H. Bolas (1915) in England, and by H. Muller-Breslau (1915) in Germany. The work of Booth and Bolas was simplified and developed by Arthur Berry (1916), and in this form is at present the best-known procedure for the solution of continuous beam problems in aeronautics.

The Berry Method is applicable only when in each of two adjacent sections of a beam, the lateral loading is uniformly distributed and the end load in the beam and its moment of inertia are constant. Thus, as well as points of support, where the end load usually changes in value, points at which isolated loads occur, points at which the uniformly distributed load changes in value and points at which the moment of inertia changes are all points of discontinuity, and the Theorem of Three Moments needs to be applied to each pair of sections separated by such a point of discontinuity. In many practical examples the numerous points of discontinuity introduce an unwieldy multiplicity of simultaneous equations. Moreover, in many examples there is a continuously varying distributed loading and a continuously varying moment of inertia. In such examples, if the Berry procedure is to be adopted, the varying distributed loading and the varying moment of inertia have to be replaced, over short lengths of the beam, by constant values which are estimated to be equivalent.

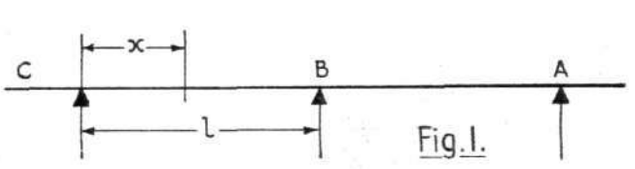


Fig. 1.

A more recent method of dealing with problems on continuous beams with end loads is the Polar Diagram Method due to H. B Howard (1928). This is a very elegant method which can be applied to obtain the essential Three Moments Equations, and from which, as the only real points of discontinuity are the points of support, the large number of simultaneous equations occurring in the Berry Method on account of changes in any of the variables are eliminated. As in the Berry procedure, however, continuous variations of distributed load and moment of inertia have to be represented by "steps" over which these parameters have constant values; if the variations are great, then the number of "constant value steps" will have to be large to give a close approximation, and the diagrams will become complicated. Moreover, the method is not applicable at all when the end loads are tensile.

My object in writing this note is to draw attention to a method in which the only points of discontinuity are the support points, in which continuous variations of lateral loading and moment of inertia are treated as such, and which is equally applicable to cases involving tensile and compressive end loads.

This method, which, like previous methods, leads to Three Moment Equations, is based upon the successive approximation solution of differential equations due to E. Picard, and is put forward by H. Roxbee Cox in the form of Appendix III to R. and M. 1507 (1932). As R. and M. 1507 deals with the torsional distortion of aeroplane wings, the enquirer into the theory and calculation of continuous beams is quite likely to miss the brief appended note on a method which is applicable to the most complicated form of continuous beam problem and which is very straightforward to apply.

The remainder of this article is in three sections. § 2 gives the notation used, § 3 is devoted to the analysis by which the method of procedure is evolved, and § 4 describes the method of procedure in detail with reference to an example. There is no need to master the mathematics of § 3 before applying the method, so that the reader whose interests are mainly utilitarian may omit § 3.

Section 2.—Notation

Referring where necessary to Fig. 1

Let C, B, = Any two adjacent supports of a continuous beam, distant l apart;

x = distance of any point in CB from C;

y = deflection at x, positive upwards;

I = moment of inertia of beam section at x;

w = lateral loading per unit run at x, positive upwards;

P = constant end load in CB, positive when compressive;

M = bending moment at x, positive when the beam is concave upwards;

Y = shear at x, positive when M increases positively with x.

Section 3.—Analytical Basis of Method

The analysis here given is not in essentials different from that of Roxbee Cox in R. and M. 1507.

The bending moment at any point of CB is

$$M = -Py + \int_0^x \int_0^x \omega (dx)^2 + Y_c.x + M_c \quad .. \quad (1)$$

Differentiating twice, and remembering that $M = EI \frac{d^2y}{dx^2}$

$$\frac{d^2M}{dx^2} = -\frac{P}{EI}M + \omega \quad .. \quad .. \quad .. \quad .. \quad (2)$$

It is usual to write $\mu^2 = \frac{|P|}{EI}$ .. .. .. (3)

where |P| is the numerical value of the end load, so that when P is positive (i.e., compressive),

$$\frac{d^2M}{dx^2} = -\mu^2 M + \omega \quad .. \quad .. \quad .. \quad .. \quad (4a)$$

and when P is negative (i.e., tensile),

$$\frac{d^2M}{dx^2} = \mu^2 M + \omega \quad .. \quad .. \quad .. \quad .. \quad .. \quad (4b)$$

We proceed to the solution of

$$\frac{d^2M}{dx^2} = \eta^2 M + \omega \quad .. \quad .. \quad .. \quad .. \quad .. \quad (5)$$

where η^2 can at will represent μ^2 or $-\mu^2$, and is a function of x.

By double integration of (5)

$$M = \int_0^x \int_0^x \eta^2 M (dx)^2 + \int_0^x \int_0^x \omega (dx)^2 + Y_c.x + M_c \quad (6)$$

In the process of solving this equation by successive approximations, any value of M may be taken as a starting

* Mr. Hanson began his studies under Dr. H. Roxbee Cox in the Department of Aeronautics at Imperial College. He is now engaged in the Experimental Section of the Marine Aircraft Experimental Establishment at Felixstowe.

point. If we then put this first approximation M_1 in the right-hand side of (6) we obtain a second approximation M_2. Putting M_2 in the right-hand side of (6) we obtain a third approximation M_3; and so on. If this, which is Picard's process, is a convergent process, we have mathematically an exact solution for M. If the successive approximation to M is performed graphically, then we are clearly entitled to claim M_n as the solution when M_n differs inappreciably from M_{n-1}.

It is convenient to take for the first approximation the value of M corresponding to $\eta^2 = 0$. That is, from (6)

$$M_1 = \int_0^x \int_0^x \omega(dx)^2 + Y_c.x + M_c \quad .. \quad .. \quad (6a)$$

$$\text{Then as } M_2 = \int_0^x \int_0^x \eta^2 M_1 (dx)^2 + M_1 \quad .. \quad .. \quad (6b)$$

$$\text{in general } M_n = \int_0^x \int_0^x \eta^2 M_{n-1} (dx)^2 + M_1 \quad .. \quad (6n)$$

Thus we find

$$M = a_x + Y_c.\beta_x + M_c.\gamma_x \quad .. \quad .. \quad .. \quad (7)$$

where a_x, β_x and γ_x are theoretically infinite series; a_x is a function of ω, η^2 and x, while β_x and γ_x are functions of η^2 and x. These series are in practice rapidly convergent and can easily be summed graphically. Their actual forms are given in (14) of § 4.

When $x = l$ $M = M_B$. Consequently, if a_l, β_l and γ_l are the values of a_x, β_x and γ_x at $x = l$,

$$M_B = a_l + Y_c.\beta_l + M_c.\gamma_l$$

$$\text{or} \quad Y_c = \frac{M_B - M_c \cdot \gamma_l - a_l}{\beta_l} \quad .. \quad .. \quad .. \quad (8)$$

Now $M = EI \frac{d^2y}{dx^2}$, and thus

$$\frac{dy}{dx} = \int_0^x \frac{a_x}{EI} dx + Y_c \int_0^x \frac{\beta_x}{EI} dx + M_c \int_0^x \frac{\gamma_x}{EI} dx + E_1 \quad (9)$$

Integrating

$$y = \int_0^x \int_0^x \frac{a_x}{EI} (dx)^2 + Y_c \int_0^x \int_0^x \frac{\beta_x}{EI} (dx)^2 + M_c \int_0^x \int_0^x \frac{\gamma_x}{EI} (dx)^2 + E_1 x + F_1 \quad .. \quad (10)$$

When $x = 0$ $y = 0$ $\therefore F_1 = 0$

Also $y = 0$ when $x = l$, so that

$$E_1 l = -\int_0^l \int_0^x \frac{a_x}{EI}(dx)^2 - Y_c \int_0^l \int_0^x \frac{\beta_x}{EI}(dx)^2 - M_c \int_0^l \int_0^x \frac{\gamma_x}{EI}(dx)^2 \quad .. \quad .. \quad .. \quad (11)$$

Thus from (9) and (11)

$$\frac{dy}{dx} = \int_0^x \frac{a_x}{EI} dx + Y_c \int_0^x \frac{\beta_x}{EI} dx + M_c \int_0^x \frac{\gamma_x}{EI} dx - \frac{1}{l} \int_0^l \left[\int_0^x \frac{a_x}{EI} dx + Y_c \int_0^x \frac{\beta_x}{EI} dx + M_c \int_0^x \frac{\gamma_x}{EI} dx \right] dx \quad .. \quad .. \quad .. \quad (12)$$

This equation refers to the bay CB (Fig. 1), in which C is the origin of x. A similar slope equation, which we can call (12a), can be obtained for the bay BA, taking the origin of x at B. Introducing suffixes to distinguish bay CB from bay BA, and putting $x = l_{CB}$ in (12) and $x = 0$ in (12a), we have two expressions for the slope at B which, when equated, give the Three Moments Equation appropriate to the support B. This is (13) of § 4.

When there are n supports between the two ends of the beam there will be n of these Three Moment Equations, which, together with the conditions at the extreme ends, will be sufficient for the complete solution of the problem.

Section 4.—Method of Procedure and Example

§ 4 (1). THE THREE MOMENTS EQUATION.

For any two adjacent bays CB and BA, the Three Moments Equation in M_C, M_B and M_A is

$$\left[\int_0^l \frac{a_x}{EI} dx - \frac{1}{l} \int_0^l \int_0^x \frac{a_x}{EI} (dx)^2 \right]_{CB} + \frac{M_B - M_C \cdot \gamma_{l_{CB}} - a_{l_{CB}}}{\beta_{l_{CB}}} \times \left[\int_0^l \frac{\beta_x}{EI} dx - \frac{1}{l} \int_0^l \int_0^x \frac{\beta_x}{EI} (dx)^2 \right]_{CB} + M_c \left[\int_0^l \frac{\gamma_x}{EI} dx - \frac{1}{l} \int_0^l \int_0^x \frac{\gamma_x}{EI} (dx)^2 \right]_{CB} = \left[-\frac{1}{l} \int_0^l \int_0^x \frac{a_x}{EI} \right]_{BA} + \frac{M_A - M_B - \gamma_{l_{BA}} - a_{l_{BA}}}{\beta_{l_{BA}}} \left[-\frac{1}{l} \int_0^l \int_0^x \frac{\beta_x}{EI} (dx)^2 \right]_{BA} + M_B \left[-\frac{1}{l} \int_0^l \int_0^x \frac{\gamma_x}{EI} (dx)^2 \right]_{BA} \quad (13)$$

where

$$a_x = \int_0^x \int_0^x \omega(dx)^2 + \int_0^x \int_0^x \eta^2 \int_0^x \int_0^x \omega(dx)^4 + \int_0^x \int_0^x \eta^2 \int_0^x \int_0^x \eta^2 \int_0^x \int_0^x \omega(dx)^6 + \quad .. \quad (14a)$$

$$\beta_x = x + \int_0^x \int_0^x \eta^2 x(dx)^2 + \int_0^x \int_0^x \eta^2 \int_0^x \int_0^x \eta^2 x(dx)^4 + \quad (14b)$$

$$\gamma_x = 1 + \int_0^x \int_0^x \eta^2 (dx)^2 + \int_0^x \int_0^x \eta^2 \int_0^x \int_0^x \eta^2 (dx)^4 + \quad (14c)$$

and η^2 represents $\pm \frac{P}{EI}$, being negative for compressive and positive for tensile end loads.

In certain cases, where ω, I and E and thus η^2, are simple functions of x, it may be possible to evaluate the above series analytically, and in the special case of these variables remaining constant in each bay, it can be shown that the Three Moments equation (13) reduces to the well-known Berry form, with its trigonometrical functions for compressive end loads and the hyperbolic functions for tensile end loads. Generally, however, graphical methods will be most convenient.

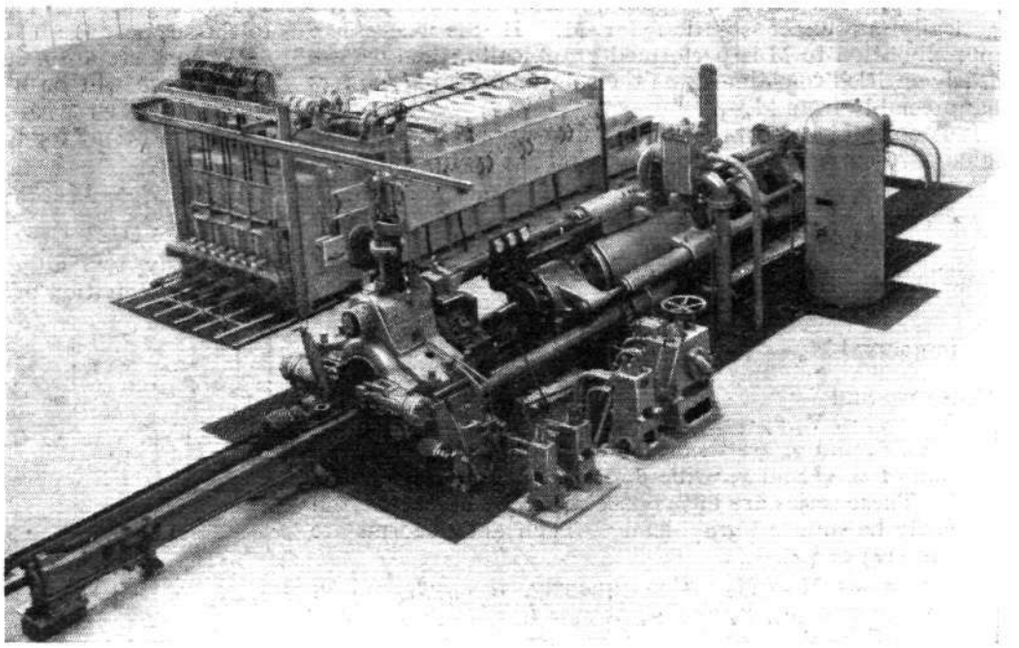
(To be concluded next month.)

Pyrometer Plant Demonstrations

With the co-operation of the Shropshire, Worcestershire and Staffordshire Electric Power Company, the Foster Instrument of Letchworth and Wild-Barfield Electric Furnaces, Ltd., of London, are holding demonstrations of electrical pyrometer equipment and heat treatment plant at the Electricity Works, Summer Street, Redditch, from April 24 to May 3, daily, from 10 a.m. to 5 p.m.

LIGHT ALLOY EXTRUSION

The Production of Seamless Tubes and Bars for Aircraft Work : A Famous Factory Visited



The type of extrusion press described in this article. On the far side of the press is the electric billet-heating furnace.

EVEN the expert finds it fascinating to watch machinery handling metal as though it were butter—to see hammers smiting glowing steel into desired shapes with as much ease as if it were made of plasticine ; to stand in a shop full of sparks, while roaring furnaces heat the billets ready for the hammer, and all is noise and, to the uninitiated, seething turmoil.

Handling light alloys is quite a different matter. Large hammers usually only deal with steel, but light alloys, of course, are amenable to less spectacular methods. They become plastic at lower temperatures than does steel, and can then be extruded from large presses, the resultant tube or bar virtually oozing out ; the writer, when he watched the process during a visit to the Birmingham works of Reynolds Tube Company, was irresistibly reminded of a slowly squeezed tube of tooth-paste.

Extrusion is a most interesting subject, and the field it covers is a very large one ; there are extrusion presses for dealing with all classes of metals, including light alloys. The latter produce the greater proportion of the tubes and sections which are now so widely used in the construction of aeroplanes and flying boats.

The press which has been installed in the works of the Reynolds Tube Company is of the horizontal type, and is worked by hydraulic pressure. Large hydraulic pumps driven by electricity are housed in a central pump room close to the press, and they work entirely automatically, maintaining the pressure at a level figure. Between the pumps and the press itself are storage accumulators which help to ensure that the pressure does not fluctuate. The pressure applied to the main ram of the press is, in this case, 2,000 lb./sq. in., and it can be controlled by a throttle valve to vary the speed of extrusion.

The Billets

The raw material is prepared for the press in the form of short, circular-section billets, which are cast by the makers of the material, in the Reynolds Works this is generally Hiduminium R.R.56, obtained from High-Duty Alloys, Ltd., of Slough. These billets are heated in a large electric furnace, which is close alongside the press. The temperature is very closely controlled, for it plays a large part in producing consistent results. All the material used for aircraft work is, of course, released in the first place under an Air Ministry release note, and a complete analysis record of each cast of billets is kept, so that there can be no question of anything but perfect material, and hence trouble-free production.

When the billet has been heated correctly it is immediately transferred to the press, in which the die and container is gas-heated to prevent chilling the billet ; then the ram comes up and slowly pushes the metal through the die. Strong alloys are usually extruded slowly, but variations in speed are made according to the size of the section or tube.

The final structure of the extruded material differs considerably from that of the cast billets, in which the hardening constituents were distributed at random, forming a fine network, with a crystal grain of polygonal form and of varying orientation. After extrusion the structure is completely broken down ; the grain is smaller, more regular and interlocked, having its axial inclination in the direction of extrusion, so that each grain takes similar fractions of any load applied, giving a more even distribution throughout the extruded specimen, and, in consequence, greater strength.

Heat treatment improves the physical properties of most light alloys and, after extrusion, all the bars, tubes and sections are heated to the necessary temperature and then quenched, after which they are either left at room temperature or again heated for some time to accelerate the "age hardening" to which some alloys are susceptible. This metallurgical process is rather interesting. When the material is heated for the first time the hardening constituents in it are taken into solution by the matrix and retained in this condition by the quenching. The second heating—in the case of R.R.56, to a temperature of 170 deg. C.—has the effect of precipitating the hardening constituents in sub-microscopic particles along the grain boundaries ; this keys the grains together, provides considerable resistance to deformation and improves the physical properties.

After heat treatment the tubes, bars or sections have to be straightened, and in some cases are put through dies on a draw-bench for accurate sizing. Tubes, of course, have been previously cold-drawn from larger extruded tubes.

The whole subject of extrusion is one of unbounded interest and, for aircraft construction in particular, the process offers limitless possibilities where light alloys are used. For example, there would seem to be little objection to the extrusion of spars for wings or other members in any desired section ; the die would be expensive, but once that cost had been met the actual production of such spars should be an extremly economical process.

Correspondence

The Editor does not hold himself responsible for the opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for publication in these columns.

SIMPLIFYING CONTROL: AN INTERESTING SUGGESTION

[3030] When I originally replied to your paragraph on "The Essential Rudder" I hardly expected that my letter would appear in a full page article. May I, however, add a word or two more?

Perhaps I should reply in full detail to the remarks which follow the letter, but I am afraid that once more I am a little confused as to the issue. Since "H. A. T." assures me of it, I should admit to having misread his 'Essential Rudder" (how I hate that title!). I am afraid I am in danger of doing precisely the same thing with his 'Experimental Tactics." Rather, therefore, than make a bigger fool of myself may I please be allowed to withdraw from this rather complicated argument with such grace as I can muster? For truth to tell I still don't know exactly what it is that he is suggesting, and, as we all know, Theory can prove anything when it comes to Aviation!

My second point is, I hope, more constructive, and is one that, although not original, is certainly open to much speculation.

"H. A. T.' says, at the end of the first paragraph on page 387, "It might be possible to do without the ailerons. . . ." Surely this is carrying it *too* far? I absolutely agree that the controls of an aircraft should be simplified, but isn't it the *rudder* that we should learn to do without? I visualise the abolition of the rudder and the institution of split flaps on the wing tips.

Surely this is the solution, and I know that in 1928 this theory was expounded with great success by certain well-known pilots. Imagine split flaps with the ailerons. We could abolish this unessential rudder, and our directional control would come from the wing tips. . . . Think of the advantages. Positive operation at the lowest speeds, reduced drag, no skidding on our turns, lovely air brakes for landing, increased aspect ratio on our aircraft, and, above all, the greatest ease of recovery from spins. . . . Marvellous!

I leave "H. A. T." to visualise this Utopia.

London, W.1. C. CLARKSON.

EMPIRE AIR DAY—MACHINES WANTED

[3031] If there are any private owners in this country who are not using their machines on Empire Air Day, the Air League would be very grateful if they would put them at the disposal of their local Aero Clubs.

A number of "B" licence pilots have promised their services on this occasion, but some of them have not their own machines, and if the owners of machines who do not wish to fly them and have no pilot would get in touch with the Air League it is quite possible that pilots can be found.

J. A. CHAMIER,
Secretary-General, Air League of the British Empire.

THIS ARMAMENT BUSINESS

[3032]—Notwithstanding the mouthings of chameleon politicians and the trumpetings of be-medalled dictators the causes of war remain of a fundamentally economic character.

Talk as we will of strong alliances against some monster or other, and of the importance of air defence (the subject of your leading article last week), the fact remains that only people who are individually unhappy or under-nourished can ever be desperate enough to go to war. Victor and vanquished together will be blown to shreds of shivering protoplasm or gassed into screaming automatons in support of causes which they know to be futile.

Germany, denuded of colonies and rights after a war in which she, like everyone else, fought for economic self-preservation, now demands these colonies and rights. If we ring her with steel we are only postponing the day when the giant boiler will burst. Knowing that the whole world is linked together in the matter of economic interdependence, surely we might allow a little harmless steam to escape before Western civilisation is wrecked in the explosion?

The peace of the world depends not on the power of fear in a Euclidean universe where it is mathematically impossible for every nation to be stronger than any other, but on the ability of economic experts to stabilise currency and so restart the flow of trade. There is enough and to spare for everyone, and it appears, perhaps, a little foolish to use unlimited energy in producing and using war materials when this energy could be so sensibly devoted to reorganising a world so that I, with a cow to sell and the need for a car, can be brought into touch with someone who has a car to sell and the need for a cow.

Anyone who has been to Germany must laugh at the suggestion that Herr. Schmidt is any more of a monster than Mr. Smith, or that Germany worships Force (the abstract noun—not the breakfast food) much more noticeably than the director of an aggressive chain of grocery stores in Little Puddlecombe district. Of course they like pretty uniforms—but could anything be prettier or more futile than the uniform of a peacetime Guardsman? I am even willing to believe that Herr Hitler could find some spark of human feeling in his breast if somebody gave him time to look.

For heaven's sake let us forget Waterloo and the playing fields of Eton, and remember Passchendaele and the derelict villages of South Wales. We might stop playing at soldiers for a moment and do a little tidying up. SPECTATOR.

London, S.W.3.

"THE FLYING SLOT"

[3033] Might I comment on the drawings and notes on the *Pou-du-Ciel* in your issue of April 18. First, if the engines were on the rear wing, as shown in the drawings from the *Handley-Page Bulletin*, it would seem impossible to get the c.g. far enough forward to get longitudinal stability. Even if the fuel were carried in the front wing the machine would be tail heavy, for there are no weights far enough ahead of where the c.g. must be; making the wings of equal span could be made to help matters, of course.

Secondly, I feel that somebody owes it to your readers to point out what seems to be a gulf (or at least a very wide slot!) between the *Pou* wing arrangement and Mr. Handley-Page's invention. If one studies Mr. Handley-Page's and Mr. Lachmann's patents one finds that one of the main features is that the forward wing is at a substantial *negative* angle to the rear or main wing, and, in fact, the claims in Mr. Handley-Page's original patent are all based on this negative angle. There is an earlier (void) patent by a Mr. Leigh (a dentist in Chile who did wind tunnel tests) in which a narrow auxiliary wing was mounted just above and ahead of the leading edge of the main wing and was set parallel or at a slight negative angle to the chord. This would seem to vouchsafe to at least all in this country the free use of the auxiliary wing (as since tested in U.S.A.) *unless it is set at a substantial negative angle*; in any case, the original Handley-Page patent expires very soon in the ordinary course.

In M. Mignet's design, on the contrary, it is essential that there be an actual geometric *positive* angle between the wings—even with stick right forward—for he relies on this for stability. It would thus be difficult to maintain that the *Pou* resembled Mr. Leigh's design even, much less the slot, and one cannot allow one's great admiration of Mr. Lachmann and Mr. Handley-Page to blind one to the truths of the position.

Thirdly, I should like to suggest that if the Mignet wing arrangement is proved to have a "super-efficiency," it is going to mean at least one of three very interesting things. Either the profile drag of the combined wings must be reduced in some way by their inter-action ,or this wing arrangement must affect a greater depth of air than a monoplane or biplane, or else it must depress the air beyond the wing tips; only by these last two means would it seem possible to get a reduction of induced drag—by reducing the kinetic energy left behind in the air. Frankly, it is hard to see why any of those three effects should be produced.

Edgware. W. E. GRAY.

HERE and THERE

"Looking at the Air"

Between May 20 and July 22 the Midland Regional station will be broadcasting a series of six talks under the title of "Looking at the Air." Among the speakers, who are all intimately connected with aviation, will be Mr. Lindsay Everard, M.P.

Towards New Zealand

In view of the fact that tenders for the projected mail extension from Australia to New Zealand will shortly be called for, it is interesting to note that Sir Charles Kingsford Smith has definitely stated that he will put one in.

The Wilbur Wright Lecture

The Wilbur Wright Memorial Lecture and Conversazione will be held in the Science Museum, South Kensington, by permission of Colonel E. E. B. Mackintosh, Director of the Museum, on Thursday, May 30.

The lecture will be read by Mr. D. W. Douglas, President of the Institute of Aeronautical Sciences, U.S.A., and designer of Douglas aircraft.

The Late Flt. Lt. M. C. Dudding, R.A.F.O.

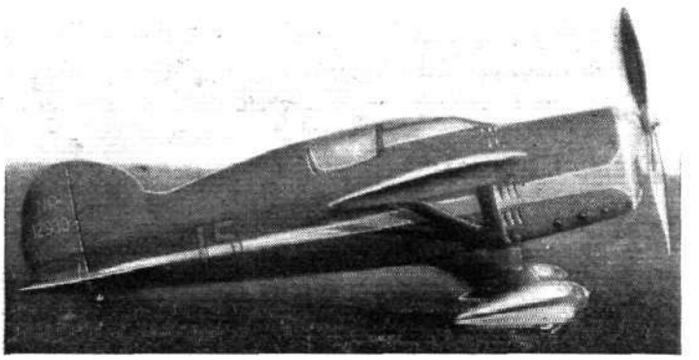
Flt. Lt. M. C. Dudding, R.A.F.O., met with a fatal accident whilst landing a Miles "Hawk" at Malmesbury last Friday afternoon. Only a few days previously he had accepted the post of pilot to Mr. Gardner, of Warlingham, though he remained instrument-flying instructor to Surrey Flying Services, Ltd., at Croydon, in which capacity he had been employed for the past six months.

Flt. Lt. Dudding joined No. 5 Squadron, R.F.C., in 1916 as an aircraftman, and subsequently served in 31 and III Squadrons in India and Palestine respectively. Later he was for six years at No. 5 F.T.S., Sealand, as an instructor, having in 1921 passed the C.F.S. Instructors' Course at Upavon, category B.I.; in 1925 he was recategorised as A.I.

In January, 1928, his civil aviation career began with an appointment as an instructor at the Sir W. G. Armstrong-Whitworth, Ltd., R.A.F. Reserve Training School, Whitley, Coventry, where he was for a time in charge of operations prior to being transferred to Hamble in 1931. At Air Service Training, Ltd., he passed the instrument flying course and instructed Reserve officers and civil pupils in this branch of training, and afterwards organised the flying boat and seaplane training courses at Hamble prior to resigning in May, 1933.

He next joined Spartan Air Lines, Ltd., and put up a very regular performance with a Spartan "Arrow" on the early morning Croydon-Ostend newspaper service, and was later to become even more well known for his steady flying and sound judgment in all weather conditions on the Croydon to Isle of Wight route of that company. He left Spartan Air Lines, Ltd., after having explored the possibilities for an amphibian run to the Channel Isles, and in October last year resumed instructional flying with Surrey Flying Services, Ltd., at Croydon, where his organising ability and enthusiasm resulted in provisional Air Ministry approval being accorded to that company's "blind-flying" course. He was a member of the G.A.P.A.N., and had, in all, flown over 5,300 hours.

Dudding's loss will be keenly felt by a wide circle of friends both within and without of civil and Service aviation (writes a correspondent), and none more so than at Croydon, where, in the course of his duties as air-line pilot and instructor, he had endeared himself alike to colleagues of his own and other nationalities, his passengers and his pupils. To his wife, son and daughter we offer our sincere sympathy.



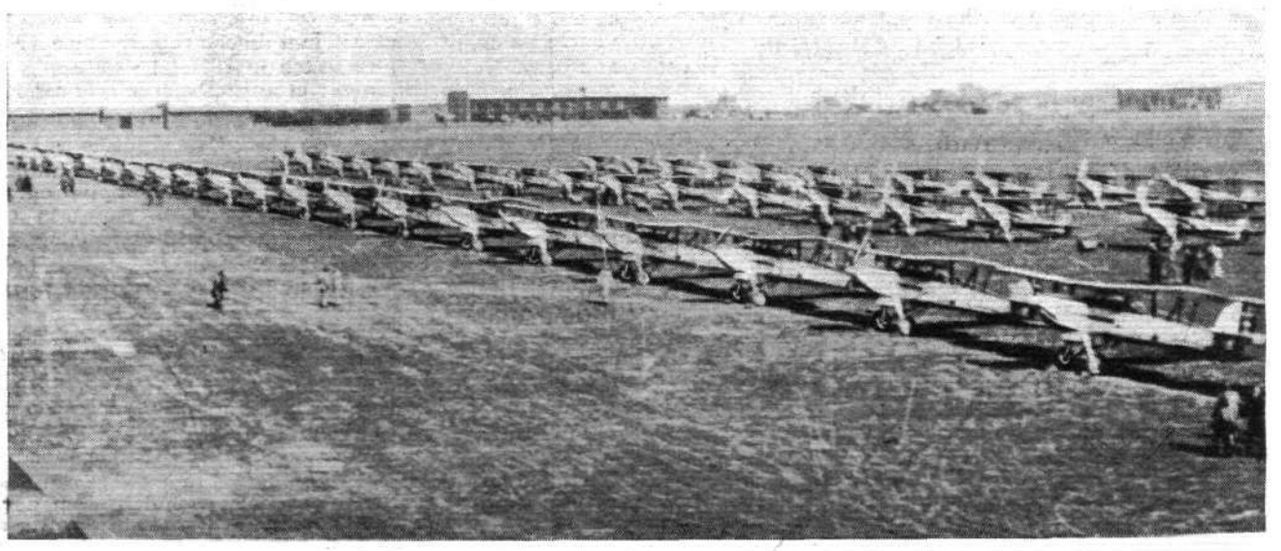
AN AMERICAN SPRINTER. "Art" Chester's tiny two-year-old monoplane, in which he has done 272 m.p.h. over a closed course. The engine is a supercharged Menasco C-4-S developing approximately 200 h.p. A new machine, essentially similar, will have a six-cylinder Menasco.

America's Aircraft Exports

Figures recently issued show that there was a marked increase last year in the oversea sales of American aeroplanes, engines, and components, shipments attaining a total of £3,532,590, as compared with only £1,836,070 in 1933—an advance of £1,696,520, or over 92 per cent. Details are as follows:—

	1934.		1933.	
	No.	Value, £.	No.	Value, £.
Aero and seaplanes, and other aircraft	490	1,639,100	406	1,078,300
Engines for aircraft	1,009	891,740	2,903	290,470
Parachutes	—	29,640	—	17,465
Other aircraft parts and accessories	—	972,110	—	449,835
Total	—	£3,532,590	—	£1,836,070

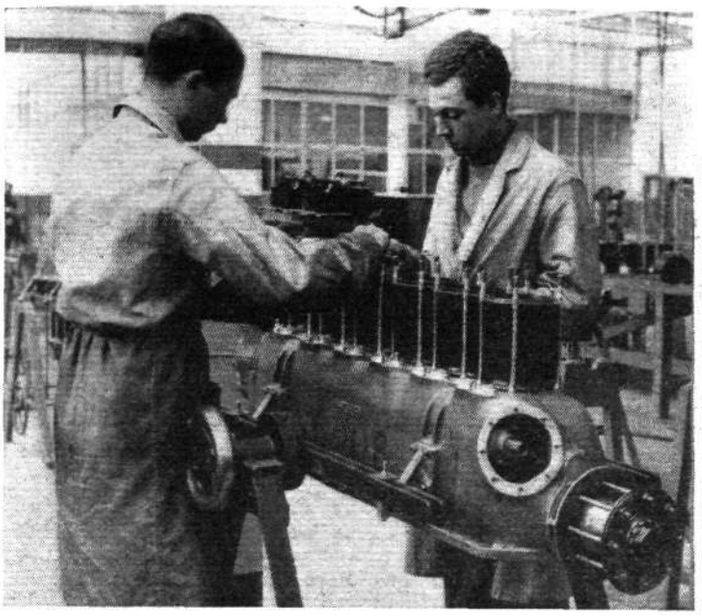
An interesting feature is the reduction in the number of exported engines coupled with a considerable increase in the gross value.



AN ELOQUENT ARRAY. A concentration of Fairey "Foxes" and "Fireflies" with Rolls-Royce "Kestrel IIS" engines at Everes Aerodrome, Belgium. The King of the Belgians has flown in one of the "Foxes."

SOUND AERONAUTICAL TRAINING

How the New Scheme at the De Havilland School Operates : A Four-year Course



IT is obvious that the aviation industry is likely to provide plenty of scope for employment of intelligent young men in the not far distant future, and already there are a number of training centres in this country hard at work preparing aspirants in the best possible way to fill positions in the various branches of the industry, administrative, technical, and practical.

It is not generally realised that the De Havilland Aeronautical Technical School, which forms the subject of these notes, has been in existence for a matter of seven years, though it is only three years since the design of aircraft has been included in its curriculum. A start was made with this section to test its usefulness, and it was soon found fully to justify its existence. Any boy of sound education can attend the school and have every prospect of becoming a useful member of an aircraft firm's designing staff after a three year's course; by that time he is not only versed in the theoretical side, but also has a sound practical knowledge, gained in the workshops.

In this connection it will be remembered that the De Havilland school has been responsible for the construction of a number of remarkably sound aeroplanes, which now total eight in number. The school design office was alone responsible for the T.K.1, the two-seater biplane which took fifth place out of a field of forty-three in the King's Cup Race last year. Incidentally, the school is now hard at work on a low-wing cabin monoplane for this year's race.

Earlier Entry Age

Certain alterations have now been made in the training scheme, and these will be of interest to parents who are considering sending their sons to the school. In the past the minimum age limit has been eighteen years; it has now been decided to lower the age to seventeen years, and to lengthen the course from three to four years, so enabling boys who have matriculated early to begin their training without delay.

The new scheme will begin with a year in the workshops on wood detail work, metal fitting, machine shop practice, engine overhauling, welding, etc. The second year will be spent in the shops of the company's factories at Hatfield and Edgware, and will enlarge the pupil's knowledge of these subjects, also widening it to take in such subjects as electroplating, aircraft servicing, and work on airscrews.

The student will pass the remainder of his training in the drawing office, where he will study detail design, stressing, mechanical testing of components, performance calculations, and test flight observations. Periods will also be devoted to jig and tool work, costing, and stores.

The firm states that this revision will not in any way affect the established reputation of the school for the training of ground engineers, to whom over 500 Air Ministry licences have been granted. As a result of this success, however, it has been decided to offer specific training in production engineering. This course will also be one of four years, with a minimum entry age of seventeen. Naturally, these ground engineer students will spend more time in the workshops than do the design students.

Students at work on a "Gipsy" engine and on a "Moth." Apart from such work as this, no fewer than eight complete aircraft have been designed and built by the school.
(*Flight* photographs.)

In conjunction with these courses evening classes are held to enable students to reach the standard of the A.M.I.Ae.E. examination of the R.Ae.S., and it is intended to hold similar classes for the production engineering students so that they can qualify as associate members of the Institution of Production Engineers.

Air Training in H.M.S. Conway

Following the example of H.M.S. *Worcester*, the training ship H.M.S. *Conway* on the Mersey has decided to start a civil flying side for cadets, but, unlike the Thames training ship, instruction in actual flying will be given. This will be carried out at the Liverpool and District Aero Club. Cadets, who must be over seventeen years of age, will be given fifteen hours' instruction in the air, which should be sufficient to qualify for an "A" licence. There will also be seventy-eight hours' ground instruction on engines and aircraft. The extra charge for the air course will be £25.

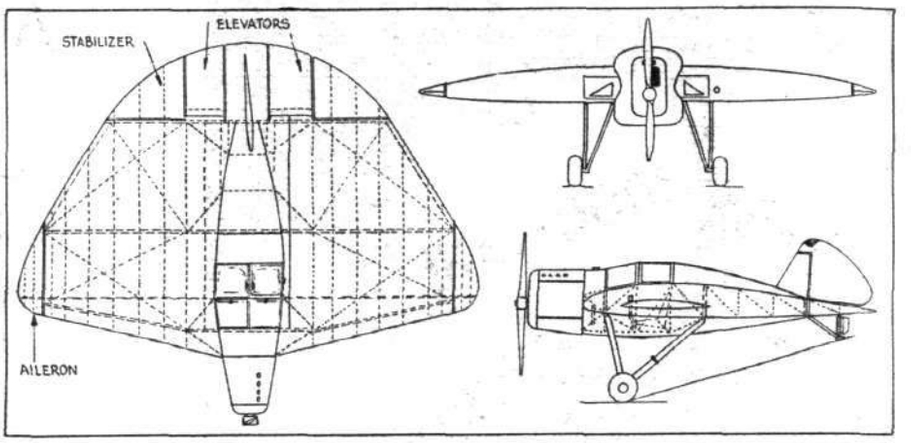
Wind Records

From time to time in the geophysical memoirs issued by the Meteorological Office, there appear memoirs dealing with research on wind and wind structure. Notable examples in recent years have been Memoir No. 54, "The Structure of Wind Over Level Country"—an exhaustive report on experiments carried out at the Royal Airship Works, Cardington—and Memoir No. 59, "A Survey of the Air Currents in the Bay of Gibraltar."

A further memoir now issued, No. 63—"Wind Records from the Bell Rock Lighthouse" by A. H. R. Goldie, M.A., F.R.S.E.—deals with the behaviour of wind over the open sea. In 1929 an anemograph was erected on the lighthouse; the instrument is thus twelve miles distant from the nearest coast, and it is also about 130 ft. above water level. The memoir gives some account of the wind structure as recorded at different times and seasons in this unique situation, and of the diurnal variations in wind speed and direction. It is obtainable from H.M. Stationery Office at 2s. 6d. net.

FLYING FLATFISH

The "All-wing" Aeroplane: Some Interesting Foreign Departures from Conventional Design



The American Hoffman two-seater "Flying Wing," which, with a British 85 h.p. "Cirrus" engine, is said to have a speed range of from 30 to 135 m.p.h.

AFTER many years of worship of the aspect ratio goddess, there is a noticeable tendency in several countries to depart from this ideal and go almost to the other extreme of using a wing which is flying "end on," or, more correctly, "corner on." Two excellent examples have just appeared, one in America and the other in Italy.

Although it is unslotted, and flapless into the bargain, the American Hoffman two-seater monoplane, which employs a wing of exceptionally low aspect ratio, is claimed to possess a speed range of 30 to 135 m.p.h.—and that on the power of an 85 h.p. engine and when using a fixed undercarriage!

The span is only 22ft. 8in. and the maximum chord as much as 14ft. 6in., giving an area of 237 sq. ft.

Welded-steel tubing is employed for the centre section, fin and rudder, the remainder of the machine being of spruce. Three spars are used for the wing, with double-drag trussing in each bay. The centre spar is twenty inches deep and the wing sections are of the M6 type, with M1 at the tip and extended M6 at the centre.

There are two elevators, with push-and-pull connections, and the "tip" ailerons are operated with a torque tube. Two stabilisers are mounted outboard of the elevators, which, it would appear, are adjustable over a range of incidence. A retractable undercarriage has been specified for the machine, although the tests were conducted with a rigid gear of the type shown in the drawings.

An English 85 h.p. "Cirrus" engine is fitted, and drives an airscrew 7ft. in diameter. Positive petrol feed, when the machine is in any position, is ensured by a Ford pump.

During tests the landing speed proved to be 28 m.p.h. The landing approach at stall angle is steep, and just prior to the wheels touching the ground the machine goes into a flattened glide. This behaviour is attributed by the designer to the positive rake of the trailing edges and the diverging air flow. With a higher wing loading the characteristic may not be achieved. Vision, it is admitted, is not so good as in conventional aircraft.

The designer visualises, as a future development, a pusher, or twin engined, version, with a three- or four-wheel undercarriage. This type, he believes, with a low wing loading, may be the solution to the "Air Flivver" problem. One feels that the view would have to be considerably improved, however, if the machine were eventually to become the "motor car of the air."

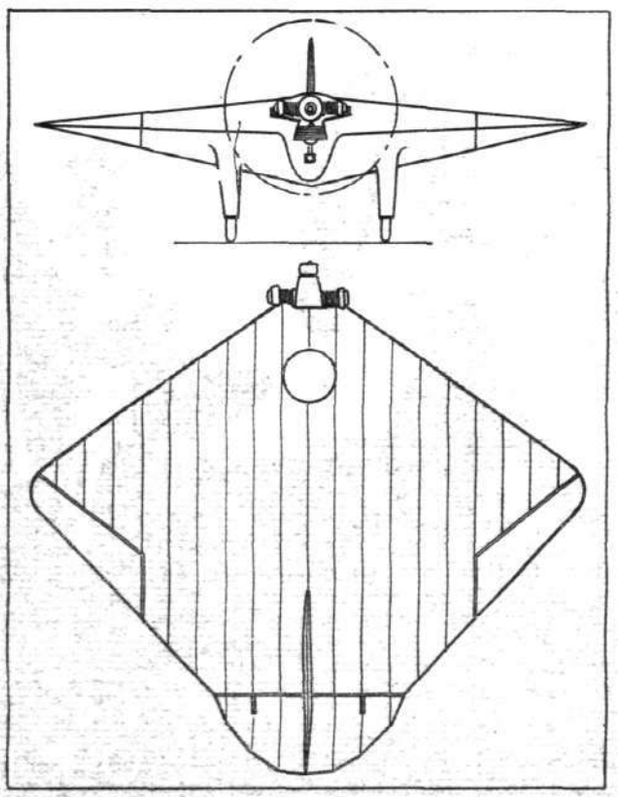
An Italian Effort

As far as is known, the other "flatfish" has not yet been built full size, but five different scale models have been tested in the wind tunnels at Rome and Turin. The wind tunnel tests are stated to have given very good results, the drag of the models being low, and the lift maintained up to angles of incidence of about 30 deg. Stability both fore and aft and lateral is reported to have been good, as was also the controllability.

The designer of this Italian rhomboidal aeroplane, Piana Canova, has now designed a full-size machine for which the following data have been calculated:—

Wing span, 16 ft. 5 in.; length overall, 16 ft. 5 in.; wing area, 141 sq. ft.; tare weight, 352 lb.; disposable load, 308 lb.; loaded weight, 660 lb.; maximum speed, 105-110 m.p.h.; cruising speed, 93 m.p.h.; landing speed, 40 m.p.h.; range, about 650 miles.

The engine which it is proposed to fit is the American Aeronca air-cooled flat-twin of 35-40 h.p.



"The Flying Plaice" would aptly describe the Italian "all-wing Canova monoplane. On the right, just to show that it takes all sorts to make a world, is a French "no-wing" monoplane, M. Payen's racing single-seater; equipped with a 400 h.p. engine, it is expected to do great things.

PRIVATE FLYING

LORD SEMPILL RETURNS TO AUSTRALIA, OVERHAULS HIS MACHINE AND VISITS LAUNCESTON

Tasmanian Interlude

ALWAYS a believer in the possibilities of aviation, I found that my three days' stay in New Guinea gave me thorough proof. As the pioneers break into new territory the ground is cleared to afford sufficient space for a landing place, aircraft bring up supplies, and a new enterprise is developed—one only made possible by the aid of flying. Nearly thirty aerodromes and landing grounds have been brought into being, and in this way the country is being opened up, providing not only a livelihood for a growing industrial body but a market for engineering and other products.

The story of flying in New Guinea is a very bright spot in the progress of aviation, and the country owes a great deal to the fine pilots who have pioneered and who continue to fly these difficult air routes. In no country in the world has air transport so thoroughly justified itself, for it has been entirely built up by private enterprise.

I should have liked to prolong my stay, but this was not possible as on my homeward journey I wished to make a complete circuit of the Continent, which meant returning by the East Coast *via* Brisbane, Sydney and Melbourne. Having crossed to Port Moresby with a following wind on the outward journey I found myself faced with a headwind on the return flight, which I intended to make direct to Cairns; this involved a longer sea crossing than the route *via* Cape Yorke, but halved the journey to that point. I was glad of my extra fuel tank, as the 500-odd miles took just over 6½ hours' flying. From Cairns I flew to Townsville and then decided to take a cross-country course to pick up the main Darwin-Brisbane route in order to study the conditions of the service operated by Qantas Airways.

Coincidence

AN interesting incident occurred when I was in the Cloncurry district, and to which I referred in a broadcast arranged by Mr. J. W. Goodwin, of the Queensland Aero Club. On this occasion it was becoming dark when I decided to land at a station which was just lighting up, and there I was received with the usual station hospitality. Just after I arrived the proprietor answered a telephone call from a neighbouring station owner, anxious to know whether the aviator he had seen passing had landed safely. After being assured on this point he enquired the name of the pilot, and, on hearing who it was, asked to speak to me on the telephone. On learning the name of the enquirer I found to my surprise and pleasure that the speaker was a fellow-countryman who had been born and brought up on my father's estate in Scotland. I remembered him very well as a boyhood companion, and although I had been aware that he had emigrated to Australia I had no idea of his location, or that we should be conversing in such happy circumstances after so many years.

Continuing my flight *via* Brisbane, where I stayed a few days to make contact with branches of various bodies with which I am associated in England, I duly arrived again at Sydney, where I had determined to give my machine a general overhaul in preparation for the further 20,000 miles I expected to cover before reaching England again. With the help, therefore, of the De Havilland organisation at Mascot I undertook a top overhaul of my "Gipsy III" engine. Having carefully examined the pistons, which had done over 1,100 hours and were of the old type, I felt it advisable to replace them. Although they might have given further good service I decided, to be on the safe side, to fit new-type pistons. As the valve guides were becoming rather worn I thought it desirable to replace these, too, as well as a few of the piston rings. I took this opportunity of taking down and checking over the tail unit, and also the undercarriage shock-absorber legs, which were settling down and becoming rather harsh. As the rubbers were considerably compressed I fitted fresh ones. In view of the large amount of flying done the necessary replacements were few, and I had every reason to be satisfied with the way the machine had stood up to the rigours of the journey.

Back Again

FROM Sydney I returned to Melbourne where I had the pleasure of many discussions on aviation questions and other matters with the Prime Minister—Sir Stanley Argyle—and others connected with military and civil aviation. On this occasion I had the honour of taking Lady Argyle, the wife of the Premier, for her first flight. She spent about twenty minutes in the air and with the utmost composure pointed out to me the chief points of interest in the City.

In order to complete my experience of Australian territory I wished to visit Tasmania, and at the conclusion of my second stay at Melbourne, took off for the island with full load, making for Devonport. The aerodrome serving this city is at Latrobe and although only in the making has a good grass surface. On approaching the north coast of Tasmania I was interested to note that the appearance of the country was quite different from that of Australia generally reminding one very much of the Devon coast at Torquay and the west of Plymouth.

Having spent some hours with friends I flew on in the evening to Western Junction, Launceston. Here the aerodrome lies to the north of a large fertile plain that runs down to Hobart between gradually converging mountains. This aerodrome is of good size and surface and has a splendid hangar belonging to Holyman's Airways. I was kindly entertained there by Colonel Mills and spent the night with him at the Launceston Club. The next day I continued my flight from Launceston to Hobart, the present aerodrome being some sixteen miles from the city and of a temporary nature. Being surrounded by high mountains, the provision of a suitable aerodrome near the city presents great difficulties, but a new site is in process of being established at Cambridge, which is, unfortunately, still too far away.

Bad Conditions

THE run from Melbourne to Hobart, with the exception of that to New Guinea, involves the worst conditions to be met with on Australian routes. The weather over the Bass Strait, which lies between Tasmania and the mainland, is often very bad, and fog, low clouds and rain are frequently encountered. Sometimes in Tasmania fog may lie up to several hundred feet for a day or so. For this route the future air service with the mainland will necessitate the use of multi-engined machines and the development of wireless and instrument flying.

Private Flying

FROM THE CLUBS

Events and Activity at the Clubs and Schools

CAMBRIDGE

Rain and wind prevented flying on several days, but on Sunday nine members of the Civil Aviation Service Corps attended and all flew. On Good Friday, six of them made flights. Two "C. of A's" are now in hand.

Flying times were 21 hrs. 55 mins. dual, and 10 hrs. 50 mins. solo.

YORK COUNTY

During the week ended April 14, 31.40 hr. were flown at Sherburn. The two new Avro "Cadets" have both been delivered, and both have been in the air continuously since their appearance.

A Management Committee has been appointed to conduct the operation of the club, and it is hoped to fix up Dawn Patrols and formation flights to neighbouring clubs in the very near future. Invitations will be welcomed.

Messrs. Seaton, Tymms, Silvester, Sagar, Foster Watson-Smith and Clegg have joined as flying members, together with five new associate members. A first solo was made by Mr. Merton Gullick, and Miss Monica Maurice has passed her licence tests. The clubhouse is in process of redecoration.

NORFOLK AND NORWICH

The fine weather resulted in one of the busiest Easters the Club has known. The "Fox Moth," which was busy joy riding over Easter, was chartered to take a member to Brooklands for the racing on Easter Monday. Several visitors arrived by air, including Mr. A. J. Linnel from Northampton, Mr. Wade from London, Mr. Peter King from Reading in his new Miles "Hawk," Mr. and Miss Finney from Bedford, Mr. Tollemache from Cambridge, and Mr. Maclachlan, in a Miles "Hawk Major" from Reading. The Hon. Derek Keppel, and Mr. Henry Fox-Wright have become pupils.

The Club will be open all day on the Monday of Jubilee week, and in the evening there will be a Supper Dance. On the following Saturday, in the afternoon and evening, Jubilee Air Displays will be at the aerodrome.

AT HESTON: Lord David Douglas Hamilton, Mr. A. Dudley ("Batts") Page, sales manager of Brian Lewis and Co., and Lord Malcolm Douglas Hamilton, who has returned from China and is now an instructor with Air Service Training.

HERTS AND ESSEX

Messrs. G. Spanton, T. Corner, and R. G. Harradance have become members and Mr. H. M. Cole has made his first solo flight.

Of the total of 66 hours' flying logged last week, 35 hr. 30 min. represented "solo."

CASTLE BROMWICH

The Birmingham-London and Birmingham-Manchester-Liverpool and Glasgow services of Railway Air Services are once more in operation.

Last week 12 hrs. 55 mins. dual was logged, and 8 hrs. 10 mins. solo. New members include Mr. and Mrs. Middleton Dawson, and among the visitors were Mr. Horn, Mr. G. G. Chen of A.S.T. and Mr. Goodwin in a "Martlet." "Cross-countries" were made to Braunstone, Whitchurch and Shrewsbury.

TOLLERTON

Among the seventeen visitors to the Club last week were Mr. H. L. Brook in his record breaking "Falcon" and Lord Willoughby de Broke who arrived for the Nottingham races.

Four machines left on Sunday for the Reading "Dawn Patrol," but were forced by fog to return to Nottingham. Mr. D. E. Hutchinson gave a dance on Friday which was attended by 150 members in the clubhouse.

The Club's flying time for the week was 27 hrs. 5 mins. There was one new flying member and seven new associate members.

READING

The "Dawn Patrol" arranged for Sunday, April 14, was rendered impossible by the English spring weather, and has been postponed until April 28.

The annual competition for the "W. J. Barnes" Challenge Cup opens on May 1, and will continue until September 30. This is an "efficiency" competition, the winner being he, or she, who gains the greatest number of marks in a series of practical and other tests.

Miles "Hawk Majors" have been delivered to Mr. Lloyd Mainwaring and Mr. Horder

BROOKLANDS

A large crowd gathered last Friday to watch the testing of a new glider—which is proving very successful—built by the College of Aeronautical Engineering for the London Gliding Club.

On Saturday a dinner and dance was held at the Club to welcome home Capt. Davis and Mr. Ken Waller from their Mediterranean cruise.

Among the new members are Mr. and Miss Baker, Messrs. Lamb and Parry, and Mr. Mandyiwalla. This last gentleman already has his Indian "B" licence, and is now studying for the English counterpart and his second class Navigator's Certificate. Mr. Van Marken has returned to Holland and Mr. Mainwaring has taken delivery of a new Miles "Hawk."

HANWORTH

Arrangements have been completed for members of the Royal Naval Flying Club to resume flying at Hanworth.

A display of night flying was given over Northwood Hills on Saturday evening by Flt.-Lt. Duncanson and Mr. J. H. Hill in connection with Royal Jubilee celebrations.

Flying time amounted to 40 hrs. 55 mins., and among the new members were Mr. M. R. Shuttleworth and Mr. R. H. Salm.

Bookings are being received for the Reading "Dawn Patrol" on Sunday, April 28.

Thirty-five hours were flown by the Autogiro school during the week ended April 14. New pupils included Cdr. Loisel, of the French Navy; Lt. Cdr. John, and Messrs. Mason, Oliver, Dansie, Frost and Bulmore.

Messrs. J. A. McMullen and J. C. Campion took joint delivery of a C.19 after renewal of its C. of A. Both hold exclusive Autogiro "A" licences, and are having a short refresher course.

Soloists included Capt. Albertas, French Air Attaché, Mr. Gilbert Elliot and Mr. Max Stoker, who has now flown just over ninety hours for his "B" licence, and will shortly complete his night and blind flying tests.

Mr. Spargo's C.30 has been packed for shipment to Australia, where he will use it for gold prospecting, and Major A. Q. Cooper's new C.30 has arrived.

LIVERPOOL
The skeleton map cross-country competition was won by Mr. W. Greenhalgh.

Flying time for the week ending April 18 amounted to 66 hr. 15 min

NORTHAMPTON
It has been found necessary to add another machine to the Club's fleet. Miss Schwedler and Messrs. Lee and Batty have commenced taking instruction.

Among the visitors to the Club were Capt. Davis, who brought Mr. Sigrist to inspect the aerodrome, Mr. Eric Davis, and Mr. Avery.

LEEMING
One pupil, Mr Rickards, has taken his licence at a total cost of £21. He had done no flying at all before going to the school Mr. Jaggar has also taken his "A" licence. Among the new pupils are Messrs. Kilpatrick, Campbell and Dumble. Visitors to the aerodrome included Messrs. Bentley, Holme, Fareweather, and Blain, and Mrs. Elise Battye called in connection with the National League of Airmen.

During last week, 17 hr. 35 min. were flown.

YEADON
An interested visitor to Yeadon was Mr. Anton Dolin, the dancer, who flew from Newcastle, and returned by air on the same day Mr. J R. Micklethwait flew to Belgium for Easter in his "Moth," and Messrs. W. L. Hey and G. W. Garnett, in their "Puss Moths," visited France.

The Aviation Group Scheme grows more popular each week, and there are now 16 members actually flying. Club aircraft put in 22 hours flying last week, despite bad weather.

PORTSMOUTH
Despite the fact that the Portsmouth Corporation still fail to realise that an airport needs ground transport facilities, the number of the public visiting the aerodrome is amazing. During the Easter holidays the public enclosure was quite full.

Members of the Portsmouth Aero Club were interested in the D.H. "Moth Major" hired to the Club by Brian Lewis and Co., Ltd. It is said that the Club is shortly to be re-equipped with aircraft of this type. Club machines have been co-operating with the local territorial forces, and Sir Charles Rose was flying his racing Miles "Hawk Major" (Gipsy Six) during the week-end

KARACHI
The total flying time during March at the Karachi Aero Club amounted to 228 hr. 35 min. Since March was the last month, until next October, in which cross-country flying could be undertaken, in reasonable comfort, members made the most of the opportunity and put up the wonderful total of 111 hr. 15 min. This figure included 59 hours' taxi work.

The outstanding event of the month was the purchase of a "Leopard Moth" from Sir Francis Humphrys, the British Ambassador to Iraq. Mr. Gadgil, accompanied by Mr. Naqui, flew to Baghdad by Imperial Airways, took delivery of the "Leopard" and flew it back to Karachi. The machine is, of course, in great demand.

Messrs. S. D. Darukhanawala and S. M. H. Naqui obtained their "A" licences, Mr. N. R. Gogte secured his "B," and Mr. Pathak obtained his ground engineer's "C." Mr. R. E. Tata has now completed all his tests for his "B" licence.

DUBLIN
In March, Dublin Air Ferries, Ltd., logged 63 hrs. 20 mins. flying, which would have been increased had not one machine been undergoing a top overhaul. Unpleasant weather has also affected the figure. During the same period there were seven first solos, one by Mr. Culleton after 7 hrs. 45 mins., another by Miss Beatty after 7 hrs. 20 mins., and one by Mr. Mick Brady, the assistant ground engineer, after 6½ hours. A deaf and dumb pupil, Mr. Peachoche, is showing great aptitude and is nearly ready for his first solo. He has been trained entirely by signs as he knows no deaf and dumb hand language.

Mr. I. Hammond has joined the school as honorary instructor, and the company has been officially formed with Mr. J. Bell, who is taking his "B" licence, as honorary secretary. Mr. Scott, famed for his lectures on navigation, has left to join a new air transport company. Arrangements are being made for Capt. Saul of Transatlantic fame to lecture in his place.

A formation flight of three machines, flown by "A" licence pupils of the school, went to the Grand National. An attempt is being made to organise an aerial cruise next month, visiting all the European capitals, Algiers, Tunis, and other Mediterranean towns.

REDHILL
Nearly three thousand people came to the Aerodrome for the Display by Sir Alan Cobham's National Aviation Day Tours. On this occasion the Club's "Fox Moth" and "Puss Moth" were busy "joy riding," and Mr. Bulstrode gave a demonstration on the Autogiro and took up several passengers.

Club aircraft last week flew 56 hrs. 55 mins. There are three new members, and three more pilots have started the blind flying course for their "B" licence endorsement. Another has been doing landings on the "Fox Moth."

CINQUE PORTS
Due to a marked improvement in the weather, 41 hrs. 30 mins. flying was recorded last week. Miss M. E. Andrewes and Mr. S. E. T. Edwards made first solo flights, and Commander Gleed has become a member. Capt. Braddell and Mr. Hossle visited Southend Aerodrome for the opening ceremony in a Club machine, and Mr. Fred Sigrist accompanied Capt. and Mr. W. E. Davis to Sywell Miss Cunnison and Mr. Lindsey Shankland will start training for their "B" licences this week.

A Miles "Hawk Major" with special equipment has been ordered by Mr. J. P. W. Topham, and should be delivered about the middle of May.

The Club will co-operate with various Jubilee celebrations on May 6, and has agreed to give a night aerobatic display at the Kent County Fair during July.

ABERDEEN
Recently, the Air Ministry asked the school, at 48 hours' notice, to do two hours' night flying over Barry, Dundee, on consecutive nights. Between November and February, more than 16 hours' night flying on behalf of the Air Ministry has been recorded, and regular twice-monthly contracts were executed by flying over Aberdeen and Broughty Ferry, Dundee, to co-operate with the anti-aircraft companies of the district.

Training on the Klemm "Swallows" is proceeding apace. Among recent visitors were Lord Ronaldshay in a "Courier," Lord Donegal, and Mr. Samuelson.

Mr. Douglas Allison has taken charge of the flying school in place of Mr. E. A. Starling, who has taken a blind flying course prior to taking over the London-Aberdeen service of Aberdeen Airways.

A Portuguese Rally

The Royal Aero Club has received from the Aero Club of Portugal the regulations governing the First International Air Rally to be held at Lisbon on June 6-8 inclusive. Private owners wishing to take part in this Rally should apply for these regulations to the Royal Aero Club, 119, Piccadilly, London, W.1.

Club for the Isle of Wight?

There are strong possibilities that a flying club may shortly be formed in the Isle of Wight. Capt. P. D. Macdonald, M.P., and Capt. H. H. Balfour have been interesting themselves in the project. Saunders-Roe have placed Somerton aerodrome, Cowes, at their disposal, and Spartan Air Lines have offered an aeroplane for instructional purposes.

A Night Flying Display

As already announced, the annual meeting of the Household Brigade Flying Club on May 29 is to take the form of a night flying display from 9.45 to 11 p.m. Admission is by invitation only, but this will probably be the first night flying display to be held in England for several years, and will serve to demonstrate the improved lighting equipment at Heston. The programme will probably include searchlight aerobatics and floodlit crazy flying.

More Touring Facilities

The Royal Aero Club has received notification from the Aero Club of Germany that the German Government has agreed to waive landing fees and give free garage accommodation for a period not exceeding forty-eight hours to air tourists coming from abroad. They must produce the identity cards issued by the national clubs to their members in the cases of countries giving reciprocal facilities to German air tourists. The list of aerodromes at which these facilities are available will be issued shortly.

Poland, who has already notified her participation in the scheme, has issued the following list of aerodromes at which these facilities are available: Warsaw (Okecie and Mokotow), Cracow (Czyzyny), Lwow (Sknilow), Poznan (Lawica), Wilno (Porubanek), Bydgoszcz and Katowice.

COMMERCIAL AVIATION

AIRLINES — AIRPORTS

UNITED'S FIRST: The new Dragon "Rapide," finished in silver with red struts, for United Airways' London-Blackpool service, which will be opened next month. (*Flight* photograph.)

CROYDON

An Inner Circle Stowaway : Big Easter Business : The First Australian Passengers : Passenger Parachutes Again

THE best story of the holiday period is of the stowaway on Inner Circle Air Lines. Just as the machine, piloted by Mr. Pugh, was moving off, a passenger was asked if he was for Heston and answered "Ja," whereupon he was hustled aboard.

On arrival an interpreter was found and his ticket examined. He was found to be a Surrey Flying Service joy-ride passenger. He was returned to Croydon and so obtained his joy ride over London as well as a free flight to Heston and back.

Inner Circle Air Lines have flown with three-quarter loads since they started, and have carried a number of passengers to connect with Isle of Wight and Jersey services, and also from Heston to Croydon for Paris and other Continental air connections.

Each day during the holidays the airport hotel roof has been thronged with visitors who, owing to the wind direction, have been able to gaze straight into the cabin windows of big machines landing through the gap between the hotel and the old "Aircraft Disposals" hangars. Owing to the rush of Continental business, every variety of aeroplane has been on show. The K.L.M. Douglas, piloted, amongst others, by Parmentier, and the Sabena Savoia-Marchetti have been to Croydon, whilst Imperial Airways has pressed the Boulton Paul and sundry D.H.86 machines into service as auxiliaries on the Paris route. Air France also duplicated services and ran to capacity.

Ostend, Le Zoute and Le Touquet have been overwhelmingly popular with travellers and Imperials, in combination with Sabena, have been hard at work on the services. Swissair, also, has carried full loads during Easter.

Olley Air Service has been remarkably active. Capt. Olley, himself, on Thursday flew to Cherbourg and back before making a trip from Croydon to Lausanne. Other activities have been an Easter air tour of their native heaths by two London Scottish business men and a rush job to Biarritz. By a queer coincidence, two 'phone calls were made within two minutes of each other by different clients. One wanted to be taken to Barcelona in a hurry, and the next required a special machine to call at Barcelona and bring back an ambulance case!

Mr. Whitney Straight flew his black and gold Hendy "Heck" into Croydon one day last week. Engine trouble had caused him to "abandon his car and take the train." He was on the way to Basle and just managed to jump on board an Imperial machine bound for Paris, where he changed for Basle.

On Easter Monday the main hall really resembled a railway station at excursion time. There were lost dogs, picnic parties, a pervading odour of oranges and peppermint, as well as worried parents convinced that "little Alfie" had gone to Paris by *Heracles* unawares.

On Saturday the two first through passengers left here for Australia by the regular Imperial service. They were the geologists, already mentioned in *Flight*, Mr. K. W. Gray and Dr. G. M. Lees. They are going on an oil survey of Australia and New Guinea. The inward machine left Australia on April 17 with Lady Louis Mountbatten and a seventy-year-old sheep farmer who has never left Australia before, and who has patiently awaited the advent of an air service before visiting England.

"An expert" has apparently told Lord Castlerosse that passenger parachutes were vitally necessary. Probably the expert sells parachutes. At any rate he did not say how thirty passengers, including old women, children, callow youths and portly gentlemen, were to be parachuted from a big air liner without panic in a sudden emergency. Air accidents, though rare, are usually sudden. So are some shipping accidents and *all* road and rail disasters. In the air you cannot solemnly parade your passengers and exhort them to be brave whilst the ship sinks inch by inch.

The corresponding thing in aviation is that very unusual occurrence—engine trouble making it impossible to maintain height. In that case passengers need safety belts to guard against a rough landing in some field rather than parachutes.

A. VIATOR.

Aerodrome for Dublin?

Mr. Hugo Flinn, Parliamentary Secretary to the Irish Free State Department of Finance, officially announced recently that plans for a civil airport for Dublin are under consideration by the Departments of Industry and Commerce, Defence, and External Affairs. It is understood that several schemes have been submitted to an Inter-Departmental Committee of Public Works. These include a plan for the reclamation of part of Dublin Bay. What is more probable is that the civil airport will be established on the derelict aerodrome at Collinstown as the land is already owned by the State.

HESTON

The New Control System in Action : Easter Traffic : Ards Re-opened

AN augmented control system on the lines of that in operation at Croydon came into force at Heston on Monday, April 15, at 8 a.m. The newly appointed Chief Control Officer, Wing Cdr. R. G. D. Small, is assisted by Flt. Lt. M. C. Pascoe. Incidentally, the services of Spartan Air Lines and Portsmouth, Southsea and Isle of Wight Aviation, Ltd., to the Isle of Wight, and the Commercial Air Hire shuttle service between Heston and Croydon, started during the week-end, so the control was kept busy.

For the benefit of pilots using or likely to use Heston several points which have already been issued as notices are worth mentioning. When the red and white panel is shown on the parapet walls of the control tower all aircraft must remain stationary, except when between the tarmac and the line of white blocks running parallel to the tarmac. Pilots wishing to depart at such times should inform the traffic office and await permission from the Control Officer. One object of this is to enable the Control Officer to warn pilots leaving Heston in bad weather of the direction from which air line or other traffic may be approaching. Pilots are requested to keep clear of air line traffic approaching to land. At such times a red Aldis lamp signal will be directed from the control tower on other aircraft in the vicinity of the approach boundary. Long, straight approaches are, of course, desirable for air line traffic.

When the Croydon controlled-zone system is in force, pilots of machines equipped with two-way radio who desire to leave Heston and enter this zone should inform the traffic office and will receive instructions to taxi into position for taking off shortly before permission arrives from Croydon. Permission (a) to take off and (b) to enter the Croydon zone will be conveyed by a single light signal from the control tower. This is to avoid unnecessary radio transmissions and in order that pilots may not be kept waiting for permission to enter the Croydon zone once they have taken off.

Easter was signified by heavy air line bookings, a big demand for hired machines and many requests for rush work by private owners whose aircraft are receiving attention in the service department. Well over two hundred passengers booked to fly from Heston to Jersey on Thursday and Friday, and services were run in duplicate and triplicate.

For the convenience of members and others wishing to visit Newmarket by air the Jockey Club have re-opened their landing ground on Newmarket Heath. The landing ground will be available for use until November 1. There have been no alterations since last season, but pilots should note that the two ridges will be marked by red flags. Aircraft operators and pilots who are not members of the Jockey Club must obtain permission to use the ground by telephoning Newmarket 437.

The Ards Airport is now re-opened to traffic after the completion of drainage operations. Customs facilities, incidentally, have been discontinued at Aldergrove since Newtownards aerodrome has re-opened.

The Link with Ceylon

Interesting developments are possible in the business of providing the first aerial link between India and Ceylon. The Portuguese Government have plans to establish a seaplane service connecting Bombay with Goa, with subsequent extension to Cochin and along the western seaboard of India, but the link between Madras and Colombo, which Tatas had anticipated this year, is not likely to be established until late in the year or early next year.

The site selected for the Colombo aerodrome is unfortunately private property, and its acquisition by Government has been hampered by some legal difficulties. Some six or seven months must elapse after the settlement of these before the aerodrome can be ready for use. Work is now almost complete so far as the Government of India are concerned on the emergency landing ground at Trichinopoly. It is anticipated that the 450 miles separating Madras and Colombo will be covered in one hop, unless, of course, intermediate traffic of a paying nature is available.

The Edinburgh Blockade

It appears that the coming week may be a critical one as far as North Eastern Airways and their hoped-for Edinburgh extension are concerned. So far as can be discovered, the Edinburgh Council's option on a municipal airport site at Gilmerton expires in a day or two—if it has not already expired—and, unless they have made up their minds to go ahead, air lines will be kept out of Edinburgh for some time to come.

The Air Ministry will allow North Eastern Airways the temporary use of Turnhouse only if Edinburgh is seriously going ahead with a civil aerodrome and that, surely, is a sufficiently generous concession. An R.A.F. aerodrome, in any case, is hardly suitable for regular civil operations.

Meanwhile, North Eastern Airways are losing about half the value of their service. It is fair to say that the farther one can travel the more valuable is speed. At present they probably carry more passengers between Leeds and Newcastle, where the train service is far from brilliant, than over any other section of the route. On the whole, for early operations, the passenger figures have been satisfactory.

Macmerry aerodrome, near Tranent, originally laid out by Scottish Motor Traction for their air operations, is at present being used by the newly-formed Edinburgh Flying Club. It is far from suitable for large-scale operations—the longest run is only 575 yards—and, in any case, it is more than twelve miles from Edinburgh's centre. The aerodrome *could* be extended, but such work would hardly be worthwhile in the circumstances.

To Glasgow and the Isle of Man

After operating during the early part of the year directly between Croydon and Speke (Liverpool) on their Belfast and Glasgow service, Railway Air Services, Ltd., are once again calling at Castle Bromwich (Birmingham) and Barton (Manchester) for their summer service. This, incidentally, now leaves Croydon at 3.10 p.m. in order that travellers from the Continent may be able to make the connection. Machines from Paris, Zurich, Amsterdam, Malmo, Berlin, Marseilles and Madrid, for instance, are all due in at or before 3 p.m., though naturally the R.A.S. machine cannot wait long for overdue services.

The return service leaves Glasgow at 8.45 a.m., and connections can be made in each direction with the Isle of Man service which opened, as already recorded, on Monday of last week. Two separate trips each way will be made between Barton (Manchester), Spuire's Gate (Blackpool) and Ronaldsway (Isle of Man)—leaving Manchester at 8.30 a.m. and 4.50 p.m., and leaving Ronaldsway at 10 a.m. and 6.10 p.m. Between May 4 and 7 an additional service will be operated, and the service is likely to be augmented later in the year. Tickets are inter-available on railway and steamship routes.

A CHARTER FLEET: Six Koolhoven F.K.43 machines which are used by K.L.M. for light charter work. The family resemblance to the unhappily defunct Mark II Desoutter is as striking as it is inevitable.

Commercial Aviation

Inland Airways in Ceylon?

Two concerns in Ceylon, it is understood, propose to start an inland air service in the island and are at present inspecting possible aerodrome sites in Nowara Eleya, Kandy, Diyatawa, and Hatton.

Birmingham's Airport

After a good deal of trouble--and a hint from the Air Ministry to the effect that Castle Bromwich could not be used indefinitely as a civil airport—Birmingham has voted some £47,000 for the development of a portion of a five-hundred acre site at Elmdon on the Coventry road. A deputation of six of the Airport Committee will spend this week in making an air tour of the Continental airports.

Spain Buys British

The Spanish Government has placed an order with General Aircraft Ltd. for a special S.T.12 Monospar to be used by the Cadastral Department of the Spanish Air Ministry.

The machine, which will be equipped with two "Gipsy Major" engines, is for special survey and photographic work, mostly over very rough country. Special provision is being made for the accommodation of large vertical cameras, and it is anticipated that the machine will be ready for delivery in about five weeks

More Isle of Man Services

Last week Blackpool and West Coast Air Services opened two new routes to the Isle of Man—from Carlisle and Belfast (Newtownards). Both are being flown once each way daily, a D.H. 'Dragon" leaving Newtownards at 10.30 a.m. and Carlisle at 12.45 p.m.

At present, therefore, the company runs three services daily from Blackpool (Squire's Gate), three from Liverpool (Speke), one from Carlisle and one from Belfast. In addition, an hourly shuttle service is run with a "Fox Moth" between Liverpool and Blackpool between 9 a.m. and 8 p.m., though the period will undoubtedly be extended later in the season.

Changing the Imperial Route

In order to investigate a matter in connection with the use of seaplanes for the Indian section of the Empire route, Mr. F. Tymms, Director of Civil Aviation, recently made a tour by air over the country east of Jodphur. He was accompanied by Maj. M. Barclay, of Imperial Airways. The inspection of the route revealed the interesting fact that there exist more natural landing places for seaplanes than for landplanes. Eastern Rajputana is packed with irrigation tanks and other expanses of water.

The use of seaplanes for the trans-Indian journey would cut out Jodhpur as a halting place. Udaipur would be used instead, the landing being made upon Udaipur Lake. Udaipur lies somewhat to the south of Jodhpur.

The French "Comet"

The French Government D.H. "Comet" which, as already recorded in *Flight*, is to be used for experimental work across the South Atlantic in the hands of Jean Mermoz, and which is one of two to be ordered, has been modified since it was flown in the Australia race.

Sixteen cubic feet of space is provided for mails, and a standard three-wavelength radio set, working on telegraphy, has been installed, with a loop aerial for direction-finding. It will be remembered that the generator and windmill are mounted in the nose of the machine, in the position previously occupied by the landing light.

The tankage has been reduced to 214 gallons, so that the still-air range is in the vicinity of 2,300 miles, and the maximum speed is about 226 m.p.h

The Pacific Service

The first 2,400-mile leg of the Pacific route was covered last week by the special S.42, which reached Honolulu from Alameda in 17 hr. 45 min.—an average of approximately 135 m.p.h. Capt. E. C. Musick is the chief pilot on this inaugural flight.

Incidentally, the base arrangements for the experimental services fit in very nicely with those for a massed Pacific flight, by U.S. naval seaplanes, to take place very shortly as part of the naval manœuvres which start next week.

Apart from the special equipment, details of which have already been given in *Flight*, the Sikorsky S.42 being used for experimental flights over the Pacific has been considerably modified, and the loading and range figures are interesting as showing what can be done to-day.

Twelve passengers only, in addition to the crew of six, are carried, so that the fuel capacity can be put up to 2,550 gallons. Eight of these passengers will be carried at the rear of the hull and four in a forward compartment, which also serves as a navigating room. Between these compartments the additional fuel tanks are arranged.

The weight of the Sikorsky, with full equipment, is 21,785 lb., and the gross weight about 40,000 lb. In Pacific form the range is 3,100 miles—or 700 miles greater than that needed for the longest leg, between San Francisco and Hawaii. The cruising speed for maximum economy is 160 m.p.h. Each of the four Pratt and Whitney S3DI-G "Hornets" will consume about 33 gallons an hour at this speed, and the Hamilton Standard airscrews have two pitch settings.

Aberdeen Airways' Plans

Mr. Gandar Dower has now definitely planned to start his Aberdeen-London service—which was surveyed in December—in the last week of May. Newcastle (Cramlington for the time being) and Hull (Hedon) will be the stopping points, though Aberdeen Airways have, of course, applied to the Air Ministry for leave to use Turnhouse if and when this is thrown open to operating companies.

Highland Airways will have competition this year. Aberdeen Airways have secured sites at Thurso, Kirkwall and in the Shetlands. Early next month a service to Thurso (Caithness) will be opened, and this will be extended to Kirkwall as soon as the piping of ditches has been completed. The Shetland aerodrome, which is seven miles from Lerwick, will not be ready until June.

The levelling of Dyce airport is now finished, but the area will not be completely ready until the end of the summer, by which time—and after Mr Hunter has been at work—the diagonal runs will be 1,000 yd. long. In the meantime a smaller strip has been rolled for temporary use. The six machines which make up Aberdeen Airways fleet will be fitted in due course with Standard radio.

On Thursday of last week Mr. Dykstra, of K.L.M., visited Dyce and made arrangements to use this aerodrome for a survey flight to Iceland which is planned for July. A Douglas machine may be used, and the suggestion is that the survey will lead to a service between Amsterdam, Aberdeen and Iceland, with a possible stop in the Faroes. But it is all very much in the air at present.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motors. (The numbers in parentheses are those under which the specification will be printed and abridged, etc.)

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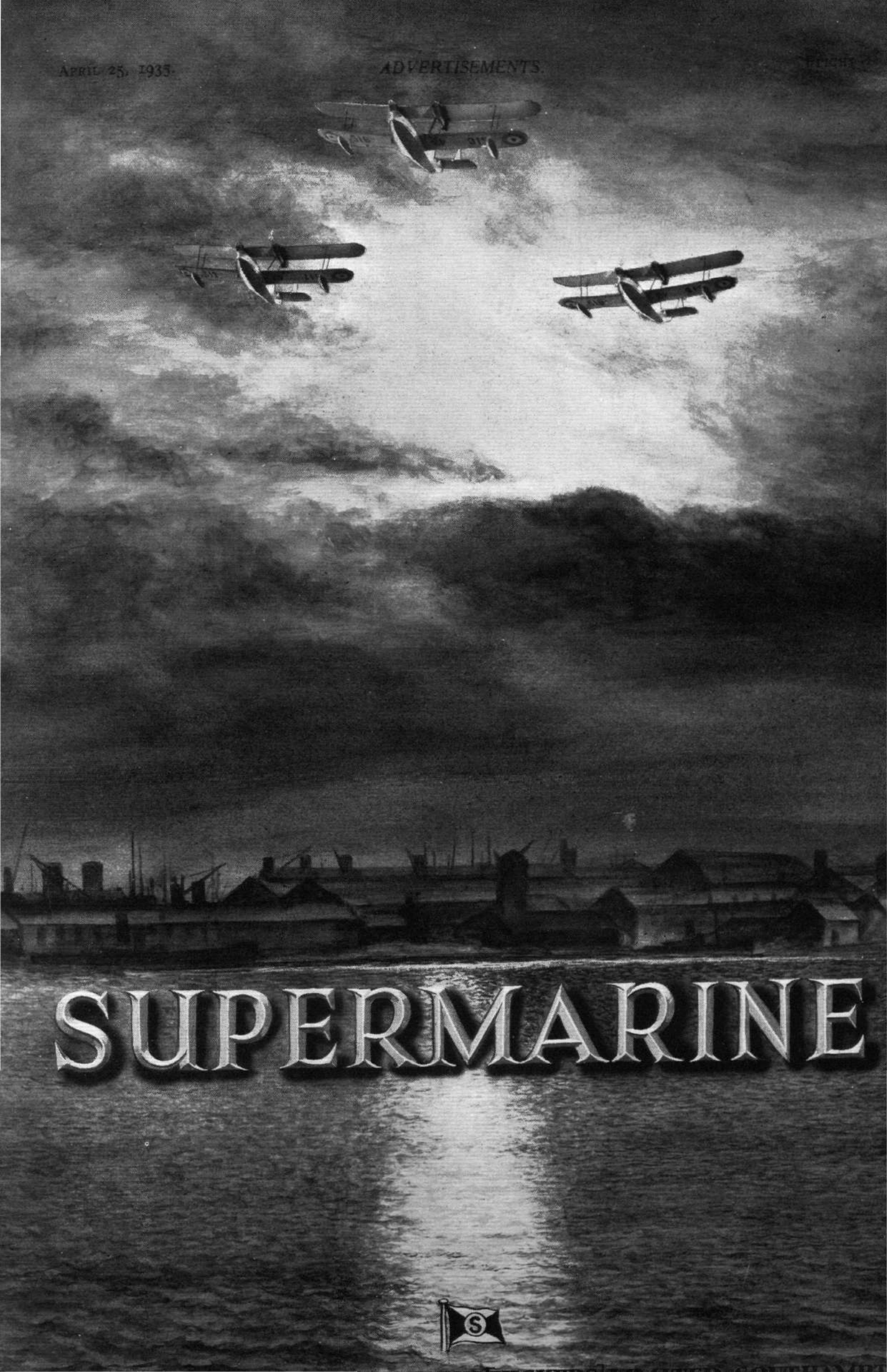
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